

# The legume-feeding psyllids (Homoptera) of the west Palearctic Region

I. D. Hodkinson

Department of Biology, Liverpool Polytechnic, Byrom Street, Liverpool L3 3AF

D. Hollis

Department of Entomology, British Museum (Natural History), Cromwell Road, London SW7 5BD

## Contents

Synopsis .....	1
Introduction .....	2
Material, methods and terminology .....	3
Acknowledgements .....	3
Key to west Palearctic genera of Arytaininae and Acizziinae .....	3
Acizziinae White & Hodkinson .....	4
<i>Acizzia</i> Heslop-Harrison .....	4
Key to species .....	4
Arytaininae Crawford .....	7
<i>Cyamophila</i> Loginova .....	7
Key to species .....	8
<i>Arytaina</i> Förster .....	10
Key to species .....	11
<i>Livilla</i> Curtis .....	19
Key to species .....	20
<i>Arytainilla</i> Loginova .....	41
Discussion .....	43
References .....	44
Index to host plants .....	84
Index .....	84

## Synopsis

Plant species of the papilionoid legume tribe, the Genisteeae, have radiated considerably in the Mediterranean Basin and are exploited, as hosts, by psyllids of the subfamily Arytaininae; other leguminous hosts exploited by this group of psyllids belong to the papilionoid tribes Galegeae, Trifoleae, Loteae and Sophoreae; species of the related psyllid subfamily Acizziinae develop on host species in the mimosoid genera *Acacia* and *Albizia*.

The taxonomy of the psyllid groups Arytaininae and Acizziinae in the west Palearctic Region is revised; the Arytaininae is considered to be a paraphyletic group but is retained for convenience; the Acizziinae is considered to be a monophyletic group. Emphasis is placed on characters of the genitalia in delimiting genera and five are recognised: *Arytaina* s. str. (11 species), *Livilla* (31 species), *Cyamophila* (4 species) and *Arytainilla* s.l. (21 species) in the Arytaininae, and *Acizzia* (4 species) in the Acizziinae. The genera *Floria* syn. n. and *Allooneura* syn. n. are synonymised with *Livilla*; *Amblyrhina* syn. n. is synonymised with *Arytaina*. Diagnostic keys are provided for the genera and identification keys are given for their included species except those of *Arytainilla*, a problematical genus that is discussed only in general terms. Sixteen new species are described; 3 new species-synonymies, 48 new combinations and one new name are proposed; one neotype and 5 lectotypes are designated; *Peripsyllopsis* is reinstated as a good genus.

The pattern of host/insect relationships between these psyllids and their leguminous hosts is examined and it is concluded that, with the present level of data, an understanding of psyllid interrelationships does not clarify the problems associated with the classification and evolution of the Genisteeae.

## Introduction

The Mediterranean Basin and the surrounding land areas of the west Palaearctic Region, together with Macaronesia, form an extensive area of endemism and diversity for a tribe of papilionoid leguminous plants, the Genisteae. This tribe has been successfully exploited as hosts by over 60 known species of jumping plant-lice, or psyllids, previously referred to the subfamily Arytaininae (Hodkinson, 1980). Other psyllids in this group colonise legumes in the papilionoid tribes Galegeae, Trifoleae, Loteae and Sophoreae and in the mimosoid genera *Acacia* and *Albizia*.

The detailed biologies of most of these psyllids are unknown. The free-living nymphs usually feed on the actively growing shoots of their hosts and can often reach high densities. Watmough (1968*a, b*) recorded peak densities of 6466 and 166 nymphs per 100 g of shoot material for *Arytainilla spartiophila* and *Arytaina genistae* respectively, on *Cytisus scoparius* in Britain. *Acizzia uncatoides* has caused severe damage to acacia trees where it has been introduced into California, France and Hawaii (Koehler *et al.*, 1966; Bain *et al.*, 1976; Leeper & Beardsley, 1976). Life history strategies and generation times appear to vary between species. *Arytainilla spartiophila*, in Britain, has a single generation per year with six months spent as an overwintering diapause egg. By contrast, *Arytaina genistae* overwinters as an adult and undergoes two or three generations per year on the same host.

The Arytaininae were reviewed by Loginova (1976*a*; 1977), who divided the group into two tribes. The genera *Arytaina*, *Amblyrhina*, *Alloeoneura*, *Floria*, *Livilla* and the central Asian *Astragalita* were included in the Arytainini; *Cyamophila*, *Acizzia*, *Arytainilla* and the North American *Amorhicola* were included in the Cyamophilini. The monotypic genus *Pseudacanthopsylla* was omitted. White & Hodkinson (1985) placed *Acizzia* in a separate subfamily, the Acizziinae, primarily on the basis of the form of the male proctiger, and expressed uncertainty as to the true position of *Cyamophila*.

Examination of species within the above genera, together with new material, leads us to conclude that the major reorganisation of species within genera, proposed in this paper, is necessary if the generic classification is to reflect natural groupings. Previous classifications have been based largely on primitive characters and the resulting taxa have been heterogeneous and ill-defined, and closely related species have often been placed in separate genera. We have attempted here to recognise what we believe are monophyletic genera or groups based mainly on characters of the male genitalia.

Six legume-feeding genera are recognised in the west Palaearctic Region: *Arytaina* s. str., *Livilla*, *Cyamophila*, *Arytainilla*, *Acizzia* and *Pseudacanthopsylla*. *Amblyrhina*, *Floria* and *Alloeoneura* are placed in synonymy. *Arytainilla* is retained as an heterogeneous genus but we recognise that it may be polyphyletic. *Pseudacanthopsylla* shows affinities with undescribed Afrotropical groups and is excluded from further consideration. We recognise two separate subfamilies, the Acizziinae which contains *Acizzia*, and the Arytaininae which contains *Arytaina*, *Livilla*, *Cyamophila* and *Arytainilla*. The Acizziinae are defined by characters of the male genitalia. We are unable, however, to find synapomorphies that would define the Arytaininae reliably and separate it from the closest subfamilies, the Psyllinae and Ciriacreminae. Loginova (1976*a*) gave a lengthy description of the group, including both adult and larval morphology. A detailed study of these characters has shown that none is present in all Arytainines and absent from other groups within the Psyllidae, and several are either primitive or subject to homoplasy. Furthermore no previously unused characters could be found. We therefore regard the Arytaininae as paraphyletic with respect to the Ciriacreminae and Psyllinae but, nevertheless, we retain the group as a convenient and widely understood entity embracing groups of psyllids that feed on legumes.

This paper contains a complete account of *Arytaina* and *Livilla*, and accounts of those species of *Acizzia* and *Cyamophila* that occur in the west Palaearctic Region. *Arytainilla* is dealt with in less detail as the species have been well-described and figured by Šulc (1907; 1910*a, b*) and Loginova (1972*a*; 1976*b*). The pattern of host/psyllid relationships between the groups of



Genistee genera and psyllid genera is also examined to see if there is any degree of congruence between their respective classifications.

## Materials, methods and terminology

A detailed explanation of the terminology used in this paper is given by Hodkinson & White (1979b) and White & Hodkinson (1985). The following abbreviations are used to indicate the institutions in which material is deposited: British Museum (Natural History), London (BMNH); Muséum National d'Histoire Naturelle, Paris (MNHN); Musée de Zoologie in Lausanne (MZL); Zoological Institute, Academy of Sciences of the U.S.S.R., Leningrad (ZI); Moravian Museum, Brno (MM); Naturhistorisches Museum, Vienna (NM); Naturhistorisches Museum, Basel (NMB); Zoological Museum, University of Helsinki (ZMU); Természettudományi Múzeum, Budapest (TM), Zoological Institute, Polish Academy of Sciences, Warsaw (IZPAN); Entomological Institute Eidgenössische Technische Hochschule, Zurich (ETH); Museo Civico di Storia Naturale, Genova (MCSN); New Zealand Arthropod Collection, Department of Scientific and Industrial Research, Auckland (NZAC); University Museum, Melbourne (UMM); I. D. Hodkinson collection (IDH); P. Lauterer collection (PL); D. Burckhardt collection (DB). All drawings and measurements are made from slide-mounted material.

## Acknowledgements

We thank the authorities and curators at the institutions listed above for the loan of material. We also thank Dr P. Lauterer, Dr D. Burckhardt, Dr S. M. Klimaszewski, Dr C. Conci and the late Dr M. M. Loginova for the loan of interesting and often undescribed material.

## Key to west Palaearctic genera of Arytaininae and Acizziinae

- 1 Male proctiger (Figs 9, 15) with a well-developed posterior lobe. On *Acacia* or *Albizia*.  
(Genal cones shorter than the vertex, triangular or broadly rounded, rarely enveloping the frons. Antennae approximately 1.3–1.8 times head width. Propleurites broad, divided by a vertical suture. Forewing oblong-oval, with or without pattern but with a distinct costal break and pterostigma; cell  $cu_{1a}$  high. Basal metatarsus with 1 or 2 thick black spurs. Male paramere of various shapes). (Subfamily **ACIZZIINAE**) ..... **ACIZZIA** Heslop-Harrison (p. 4)
- Male proctiger (Figs 23, 68, 167) simple, without a well-developed posterior lobe (Subfamily **ARYTAININAE**) ..... 2
- 2 Male paramere (Figs 23, 39, 75, 82) broad, more or less parallel-sided with a truncate apex which is extended anteriorly in the form of a pronounced tooth. .... 3
- Male paramere not of this form, either slender and gradually narrowed to apex which bears a slender inner anteriorly curving tooth (Figs 167, 176, 189, 195), or of more irregular shape. .... 4
- 3 Forewing (Figs 21, 26) usually oblong-oval, with both a well-developed pterostigma and a costal break; cell  $cu_{1a}$  high. Propleurites (Fig. 261) narrow, divided by a diagonal suture, pronotum deflexed downwards. Basal metatarsus with two thick black spurs. Not on Genisteeae.  
(Genal cones shorter than the vertex, broadly rounded, deflexed from the plane of the vertex. Eyes less convex than in other Arytainine genera. Antennae relatively stout, approximately 1.2–1.6 times the head width. Forewing with or without pattern).  
**CYAMOPHILA** Loginova (p. 7)
- Forewing (Figs 45, 49, 57) usually more oval, or more narrowly rounded at the apex, without well-developed pterostigma or costal break: cell  $cu_{1a}$  usually lower. Propleurites (Fig. 260) quadrate, divided by a vertical suture, pronotum flat. Basal metatarsus usually with one thick black spur. On host plants in the tribe Genisteeae.  
(Genal cones shorter than the vertex, triangular, broadly rounded or truncate. Eyes prominent. Antennae variable, stout to slender, 1.1–2.3 times head width.)  
**ARYTAINA** Förster (p. 10)
- 4 Male paramere (Figs 167, 176, 189, 195) a simple narrow lamellar structure gradually tapering to the apex, which bears a small inner denticle, the apex of which is directed anteriorly. Forewing (Figs 103, 107, 109, 115, 125, 135) of variable shape, usually with a distinct colour pattern or coriaceous brown or amber-coloured (*L. genistae* is the exception). Pterostigma, if present, very short; costal break present or absent. Genal cones (Figs 104, 114, 124, 154) usually long and broad, in lateral view (Fig. 259) weakly separated from the vertex (exceptions are *L. bivittata*, *L. cognata*, *L. burckhardti* and *L. vicina*) (Figs 105, 109, 110, 166). Vertex and

thorax usually covered in long dense setae (much reduced in *L. ulicis*, *L. vicina* and *L. bivittata*).

(Antennae slender, about 1.6–3.0 times width of the head. Eyes prominent. Pronotum flat; propleurites broad, divided by a vertical suture. Cell  $cu_{1a}$  of forewing usually low. Basal metatarsus with 0 to 2 thick black spurs (usually 1)). ..... **LIVILLA** Curtis (p. 19)

- Male paramere not as above, often of more irregular shape or if evenly narrowed then much longer and thinner than those illustrated for *Livilla*. Forewing membrane without distinct pattern, occasionally with a pigment pattern confined to the veins, membrane usually clear, occasionally yellowish/orange but never coriaceous. Long pterostigma and costal break usually present (*A. nubivaga* and *A. devia* are the exceptions). Genal cones shorter, in lateral view usually separated from the vertex by a distinct step. Vertex and thorax not covered in long setae.

(Antennae slender, elongate, approximately 1.4–2.4 times head width. Propleurites broad, divided by a vertical suture. Forewing usually oblong oval, cell  $cu_{1a}$  low. Basal metatarsus with one thick black spur.) ..... **ARYTAINILLA** Loginova (p. 41)

## ACIZZIINAE White & Hodkinson

Acizziinae White & Hodkinson, 1985: 271.

The Acizziinae are separated from the Arytaininae/Psyllinae by the possession of a posteriorly lobed proctiger in the male. A single genus, *Acizzia*, occurs in the Palaearctic Region.

### ACIZZIA Heslop-Harrison

*Neopsylla* Heslop-Harrison, 1949: 161; 1951: 417. Type-species: *Psylla acaciae* Maskell, 1894, by original designation. [Homonym of *Neopsylla* Wagner, 1903.]

*Acizzia* Heslop-Harrison, 1961a: 417; Loginova, 1976a: 596; 1977: 577; White & Hodkinson, 1985: 271. [Replacement name for *Neopsylla* Heslop-Harrison.]

DIAGNOSIS. Male proctiger with a conspicuous posterior lobe which may or may not bear a secondary finger-like appendage (Figs 9, 15); forewing (Figs 1, 5) with a tapered pterostigma and a conspicuous costal break; cell  $cu_{1a}$  high and characteristically shaped, leaning towards the base of the wing; genal cones little deflexed, short, rounded or pyramidal, usually not completely enveloping the frons which bears the median ocellus (Figs 2, 8); basal metatarsus with 1 or 2 black spurs; apical segment of aedeagus often complex (Fig. 17); propleurites quadrate, divided by a vertical suture. Species feed on mimosoid legumes of the tribes Acacieae and Ingae, particularly *Acacia* and *Albizia*.

COMMENTS. *Acizzia* is a widely distributed genus of more than 30 described species found in Australia, New Zealand, the Old World tropics and extending through North Africa and the Middle East to the Mediterranean Basin. Four species occur in the area considered here, two of which are introduced from Australia.

### Key to species

- 1 Forewing (Figs 5, 7) with pattern consisting of small diffuse spots primarily in the apical half. Male proctiger (Figs 15, 18) with long tubular apical portion and basal triangular lobe which bears a subsidiary finger-like projection (*acaciaebaileyanae*-group) ..... 2
- Forewing without pattern, or pattern consisting of brown clouds adjacent to the wing apex, primarily around veins  $R_s$ ,  $M_{1+2}$ ,  $M_{3+4}$  and  $Cu_{1a}$  (Figs 2, 4). Male proctiger (Figs 9, 12) with single large triangular lobe without subsidiary projections (*hollisi*-group) ..... 3
- 2 Male proctiger (Fig. 18) with the tubular apical portion short and broad. Paramere as in Fig. 19. Apex of aedeagus (Fig. 20) bulbous. Female proctiger (Fig. 294) with dorsal margin evenly bluntly acute. Forewing pattern (Fig. 7) overlying areas of conspicuously thickened spinules. Smaller species, head width less than 0.47 mm ..... **acaciaebaileyanae** (Froggatt) (p. 5)
- Male proctiger (Fig. 15) with tubular apical portion longer and narrower. Paramere as in Fig. 16. Apex of aedeagus (Fig. 17) harpoon-shaped. Female proctiger (Fig. 293) with dorsal margin sinuous, apex slender. Forewing pattern (Fig. 5) not corresponding with areas of conspicuously thickened spinules. Larger species, head width more than 0.50 mm ..... **uncatoides** (Ferris & Klyver) (p. 5)
- 3 Forewing (Fig. 3) with apical brown clouds, apex broadly rounded. Male proctiger (Fig. 12) with



- a broadly round posterior lobe. Aedeagus (Fig. 14) with a straight bulbous apex. (Israel, on *Acacia raddiana*.) ..... *hollisi* Burckhardt (p. 6)
- Forewing (Fig. 1) without obvious colour pattern, apex narrowly rounded. Male proctiger (Fig. 9) with more triangular posterior lobe. Aedeagus (Fig. 11) with reniform apex. (Egypt, on unknown host.) ..... *bicolorata* (Samy) (p. 7)

### The *acaciaebaileyanae*-group

Defined by characters in couplet 1 of key. This group comprises the introduced Australian species.

#### *Acizzia acaciaebaileyanae* (Froggatt)

(Figs 7, 8, 18–20, 294)

*Psylla acaciae-baileyanae* Froggatt, 1901: 257; Tuthill, 1952: 257. Lectotype ♂, AUSTRALIA, designated by Yen, 1977: 15 (ANIC).

*Arytaina acaciae-baileyanae* (Froggatt) Pettey, 1924: 21.

*Psylla uncata* Ferris & Klyver, 1932: 53. Syntypes ♂, ♀, NEW ZEALAND (NZAC) [examined]. [Synonymised by Tuthill, 1952: 91.]

*Neopsylla unctifata* (Ferris & Klyver) Heslop-Harrison, 1949: 162. [Mis-spelling.]

*Acizzia acaciaebaileyanae* (Froggatt) Capener, 1970: 197; Loginova, 1977: 577; Hodkinson, 1983: 343; Morgan, 1984: 36.

*Psylla acaciaebaileyanae* Froggatt; Yen, 1977: 15.

**DESCRIPTION.** Coloration. General coloration of head and thorax dull orange-yellow with darker yellowish brown markings; abdominal sclerites yellowish brown, intersegmental membranes dull pale yellow; genitalia pale brown: forewing transparent with small irregular pale brown maculations; veins pale yellowish brown; antennae dull whitish yellow with apices of segments 3–7 infuscate and segments 8–10 entirely dark brown; legs pale whitish yellow, often with faint dusky markings on the femora.

**Structure.** Head (Fig. 8) robust, genal cones very short with broadly rounded apices. Forewing (Fig. 7) oblong oval, with a well-developed pterostigma and costal break; spinules present throughout all the cells, much larger in regions where the brown maculate pattern occurs than elsewhere; cell  $m_1$  elongate; cell  $cu_{1a}$  high and strongly arched towards the wing base. Metatibia with 4 or 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 18) with a short and broad tubular apical projection and with a rounded posterior lobe bearing a subsidiary finger-like projection; paramere (Fig. 19) simple, broad basally, gradually tapering to rounded apex, with a small posteriorly directed subapical denticle on inner posterior margin; aedeagus (Fig. 20) with a bulbous apex and a long ductus ejaculatorius. Female terminalia (Fig. 294) with proctiger convex throughout dorsal margin, apex bluntly acute; ventral valve wedge shaped; circumanal pore ring simple, about one-third length of proctiger; ovipositor short and broad.

Measurements. See Table 1.

#### MATERIAL EXAMINED

12 ♂, 13 ♀, **Italy**: on *Acacia* sp. (BMNH).

**HOST PLANT.** *Acacia baileyana* F.v.M. and *A. podalyriaefoliae* Cunn.

**PUBLISHED DISTRIBUTION.** Australia (Froggatt, 1901; Yen, 1977; Morgan, 1984); introduced to New Zealand (Tuthill, 1952; Ferris & Klyver, 1932), South Africa (Pettey, 1924; Capener, 1970), Italy (Rapisarda, 1985).

**COMMENTS.** This species is native to Australia and has recently been introduced into Italy on ornamental *Acacia* trees. It is distinguished from its close relative, *A. uncatoides*, by the shape of the genal cones and details of the male genitalia.

#### *Acizzia uncatoides* (Ferris & Klyver)

(Figs 5, 6, 15–17, 293)

*Psylla uncatoides* Ferris & Klyver, 1932: 53; Heslop-Harrison, 1949: 162; Tuthill, 1952: 89. Syntypes ♂, ♀, NEW ZEALAND (NZAC, BMNH) [examined].

*Acizzia uncatoides* (Ferris & Klyver) Loginova, 1977: 577; Hodkinson & White, 1981: 492; Hodkinson, 1983: 343.



**DESCRIPTION.** Coloration. General body colour orange throughout with paler markings on dorsum of thorax; forewing membrane pale yellow to pale amber with orange-brown maculations, veins concolorous with membrane but appearing slightly darker; antennal segments 1–3 orange-yellow, the remainder brown; legs slightly paler yellow-brown, often with a slight infuscation of the femora.

**Structure.** Head (Fig. 6) with vertex relatively long, genal cones triangular with rounded apices. Forewing (Fig. 5) oblong-oval, with well-developed pterostigma and costal break; spinules present throughout wing; cell  $m_1$  elongate; cell  $cu_{1a}$  high and strongly arched towards the wing base. Metatibia with 4 or 5 thick black spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 15) with long tubular apical portion and a rounded posterior lobe bearing a subsidiary finger-like projection; paramere (Fig. 16) broad, with apex deflexed posteriorly; aedeagus (Fig. 17) with harpoon-shaped apex. Female terminalia (Fig. 293) short and truncate with a relatively large circumanal pore ring.

Measurements. See Table 1.

#### MATERIAL EXAMINED

Several hundred ♂, ♀, **Portugal, Israel, Chile** (IDH, DB, USNM).

**HOST PLANT.** In Europe this species occurs on *Acacia floribunda*, while in Israel it is found on *Acacia saligna*. Elsewhere it has been recorded from *Albizia lophantha*, *Acacia verniciflua*, *A. koaia*, *A. koa* and *A. confusa*.

**PUBLISHED DISTRIBUTION.** Australia (Hodkinson, 1983); introduced to France (Bain *et al.*, 1976), Italy (Arzone & Vidano, 1985), U.S.A.: California (Jensen, 1957; Koehler *et al.*, 1966; Madubunyi & Koehler, 1974; Munro, 1965), Hawaii (Gagne, 1971; Leeper & Beardsley, 1973; 1976), New Zealand (Tuthill, 1952), Mexico (Hodkinson & White, 1983).

**COMMENTS.** This species is native to Australia and has been introduced into several areas of the world where it has become a minor pest of ornamental or native acacias. Dr A. Yen (Australia) has compared our European material with material from Australia. *A. uncatoides* is separated from its close relative *A. acaciaebaileyanae* by the shape of the genal cones, the male proctiger, paramere and aedeagus.

### The *hollisi*-group

Defined by characters in couplet 1 of key. This group includes the native North African or Middle East species.

#### *Acizzia hollisi* Burckhardt

(Figs 3, 4, 12–14, 262)

*Acizzia hollisi* Burckhardt, 1981: 216. Holotype ♂, SAUDI ARABIA (NMB) [not examined].

**DESCRIPTION.** Coloration. General body coloration dark reddish brown throughout with paler markings on dorsum of thorax; intersegmental membranes of abdomen lighter orange-yellow; male proctiger often bright red, parameres whitish yellow; female terminalia dark brown; forewing membrane clear with brown colour pattern, veins brown; antennae yellowish brown, darkening towards apex; femora dark brown, remainder of legs pale yellowish brown. Immature specimens light orange-yellow.

**Structure.** Head (Fig. 4) with vertex relatively short; genal cones shorter than vertex, triangular. Forewing (Fig. 3) oblong-oval, with well-developed pterostigma and costal break; spinules largely confined to apical half of wing and around vein  $Cu_2$ ; cell  $cu_{1a}$  moderately strongly leaning towards wing base. Metatibia with 4 or 5 thick black spurs, basal metatarsus with 2 black spurs. Male proctiger (Fig. 12) with a broadly triangular posterior projection. Paramere (Fig. 13) with distinct notch in anterior margin; aedeagus (Fig. 14) with bulbous apex. Female terminalia (Fig. 262) relatively long and slender, with a relatively short anal pore ring.

Measurements. See Table 1.

#### MATERIAL EXAMINED

3 ♂, 3 ♀ (paratypes), 2 ♂, 1 ♀, **Israel** (BMNH, IDH).

**HOST PLANT.** *Acacia raddiana*.

**PUBLISHED DISTRIBUTION.** Saudi Arabia (Burckhardt, 1981; 1986), Israel (Burckhardt, 1981; Halperin *et al.*, 1982).

***Acizzia bicolorata* (Samy) comb. n.**

(Figs 1, 2, 9–11)

*Psylla bicolorata* Samy, 1973: 451. Holotype ♂, EGYPT (Agr. Coll. Cairo) [not examined].

**DESCRIPTION.** Coloration. General body coloration orange-yellow throughout; forewing membrane pale yellow, veins concolorous; antennae orange-yellow basally, becoming brown apically; legs concolorous with body (based on a single specimen). According to Samy the general colour is bright brown with whitish markings on head and dorsum of the thorax.

**Structure.** Head (Fig. 3) robust, genal cones shorter than vertex, with broadly rounded apices. Forewing (Fig. 2) with somewhat narrowly rounded apex; costal break and pterostigma well-developed; spinules confined to radular areas; cell  $cu_{1a}$  high but less strongly displaced towards wing base than in *uncatoides*. Metatibia with 4 or 5 thick black spurs, basal metatarsus with 2 black spurs. Male proctiger (Fig. 10) with narrowly triangular posterior lobe; paramere (Fig. 11) simple, almost parallel-sided, apex pointing anteriorly; apex of aedeagus (Fig. 12) somewhat reniform.

**Measurements.** See Table 1.

**MATERIAL EXAMINED**

1 ♂ (same data as holotype), **Egypt:** Oweinat, xi. 1937 (*Kasim*) (BMNH).

**HOST PLANT.** Unknown.

**PUBLISHED DISTRIBUTION.** Egypt (Samy, 1973).

**COMMENTS.** *A. bicolorata* is separated from the other west Palaearctic members of the genus by the lack of a forewing pattern.

**ARYTAININAE** Crawford

*Arytainini* Crawford, 1914: 106, in part; Heslop-Harrison, 1951: 417, in part.

*Arytaininae* Crawford; Vondráček, 1957: 176; Loginova, 1976a: 589; 1977: 577; White & Hodkinson, 1985: 272.

The Arytaininae, as here constituted, is probably paraphyletic and overlaps with the subfamily Psyllinae. The group has been separated previously from the Psyllinae by the more quadrate propleurites, the presence of one, rather than two metatarsal spurs, the absent or rudimentary pterostigma and the genal cones which are usually in the same plane as the vertex, rather than being deflexed downwards. In addition, Arytainine species usually occur on Leguminosae whereas Psyllinae species occur usually on Rosaceae and a variety of other dicotyledonous families. However, *Cyamophila*, which appears to have a similar form of advanced paramere to *Arytaina*, has narrower propleurites, a fully developed pterostigma and the 2 metatarsal spurs more typical of the Psyllinae.

Together the Arytaininae and Psyllinae are defined by the rounded forewing with the venation pattern in which veins  $Cu_1$  and  $M$  possess a common stem and vein  $Cu_2$  terminates adjacent to vein  $Cu_{1b}$ . The basal metatarsus usually possesses at least one spur, the genae are usually developed into cone-like processes and the 3rd antennal segment is the longest. The hind coxa also bears a well-developed meracanthus, and the male proctiger is simple and unipartite.

**CYAMOPHILA** Loginova

*Cyamophila* Loginova, 1976a: 596; 1977: 582; White & Hodkinson, 1985: 272. Type-species: *Psylla fabra* Loginova, 1964, by original designation.

**DIAGNOSIS.** Forewing (Figs 21, 26) with a well-developed pterostigma and costal break, cell  $cu_{1a}$  relatively high and arched towards base of wing; male paramere (Figs 24, 29) with apex truncate, formed of a large anteriorly directed denticle; basal metatarsus with 2 spurs; propleurites elongate, divided by a diagonal suture; genal cones (Figs 22, 27) short, in same plane as vertex, enveloping the median ocellus; eyes (Figs 22, 27) less bulbous than in many other genera; antennae relatively stout, usually less than  $1.5 \times$  head width.

**COMMENTS.** *Cyamophila* is primarily a Palaearctic genus comprised of about 35 species distributed throughout the arid regions of Central Asia but extending into the Mediterranean Basin, China and Afghanistan, and known to feed on legumes within the papilionoid tribes Galegeae, Trifoliae, Lotaeae and Sophoreae.

## Key to species

- 1 Forewing (Fig. 21) with diffuse reddish brown cloud around apex; radular spinules dense, dark brown, at low magnification appearing as small distinct spots around the wing margin. Cell  $m_1+2$  long, at least as long as the stem of vein *M*. Vein  $Cu_{1b}$  very strongly curved before its junction with the marginal vein. On *Glycyrrhiza* species ..... *glycyrrhizae* (Becker) (p. 8)
- Forewing (Figs 26, 31, 37) without pattern, radular spinules obvious but not forming distinct brown marks. Cell  $m_1+2$  shorter than the stem of vein *M*. Vein  $Cu_{1b}$  less strongly curved before junction with the marginal vein. Not on *Glycyrrhiza* ..... 2
- 2 Forewing (Fig. 26) with surface spinules occupying all the cells. Male paramere as in Figs 28, 29. On *Anthyllis* ..... *prohaskai* Preisner (p. 9)
- Forewing (Figs 31, 37) without surface spinules except in the radular areas. Male paramere as in Figs 34, 40. Not on *Anthyllis* ..... 3
- 3 Male paramere (Figs 33, 34) relatively broad, with an anterior subapical bulge. Turkey, on *Astragalus* ..... *stocklosai* (Klimaszewski & Lodos) (p. 10)
- Male paramere (Fig. 40) narrower, without an anterior subapical bulge. South-western U.S.S.R., on *Medicago* and *Vicia* species ..... *medicaginis* (Andrianova) (p. 9)

*Cyamophila glycyrrhizae* (Becker)

(Figs 21–25, 93)

*Psyllodes glycyrrhizae* Becker, 1864: 486. Syntypes ♂, ♀, U.S.S.R. [not examined].*Psylla glycyrrhizae* (Becker) Löw, 1881: 262; 1883: 239; Puton, 1886: 91; Horvath, 1904: 579; Oshanin, 1907: 351; 1912: 127; Aulmann, 1913: 16; Sulc, 1910a: 21; Vondráček, 1953: 174; Klimaszewski, 1963: 427; 1968a: 230; 1969b: 222; 1973: 208; Loginova, 1964a: 465; 1968: 305; 1972b: 140; 1981: 26; Loginova & Baeva, 1972: 6; Baeva & Kankina, 1971: 84; Gegechkori, 1969a: 222; 1969b: 722; 1978: 20; Halperin *et al.*, 1982: 32.*Cacopsylla glycyrrhizae* (Becker) Klimaszewski & Lodos, 1977: 5.*Cyamophila glycyrrhizae* (Becker) Loginova, 1977: 582; 1981: 26; Klimaszewski & Lodos, 1979: 8; Gegechkori, 1981: 119; 1983b: 148; 1984: 104; Baeva, 1985: 206.*Cyamophila odontopyx* Loginova, 1978: 86. Holotype ♂, U.S.S.R. [not examined]. **Syn. n.**

**DESCRIPTION.** Coloration. General coloration of head and thorax orange-red with white markings, abdomen and terminalia somewhat paler; forewing pale yellow with diffuse apical reddish brown pattern and dark brown spots in the radular areas; antennal segments 1–8 yellow, segments 3–8 apically darkened, segments 9–10 dark brown. All the specimens to hand are immature and it is likely that fully mature specimens are darker.

**Structure.** Head (Fig. 22) robust, genal cones short and broad, with broadly-rounded apices. Forewing (Fig. 21) with well-developed pterostigma and costal break; spinules confined to radular areas where they form distinct black marginal punctuations; cell  $m_1$  elongate, cell  $cu_{1a}$  high, vein  $Cu_{1b}$  strongly recurved adjacent to wing margin. Metatibia with 5 thick black spurs, basal metatarsus with 2 black spurs. Male proctiger (Fig. 23) simple; paramere (Fig. 24) parallel-sided with a large inner apical tooth; aedeagus (Fig. 25) with broad hooked apex. Female terminalia (Fig. 93) moderately long.

Measurements. See Table 1.

**MATERIAL EXAMINED**14 ♂, 6 ♀, **Israel** and **U.S.S.R.** (IDH); 1 ♂, 1 ♀, **Iran** (BMNH).**HOST PLANT.** *Glycyrrhiza glabra* L.

**PUBLISHED DISTRIBUTION.** Turkey (Klimaszewski & Lodos, 1977, 1979; Vondráček, 1953), Israel (Halperin *et al.*, 1982), Afghanistan (Loginova, 1972b; Loginova & Baeva, 1972), Iran (Loginova, 1972b; Loginova & Baeva, 1972), Mongolia (Klimaszewski, 1968b), U.S.S.R.: S. European part, Ukrainian SSR, Armenian SSR, Georgian SSR, Gruz SSR, Azerbaijan SSR, 'Transcaucasus', 'Pamir', Kazakh SSR, Uzbek SSR, Turkmen SSR, Tadjik SSR (Gegechkori, 1984; Baeva, 1985).

**COMMENTS.** *Cyamophila odontopyx* falls within the range of variation of *C. glycyrrhizae*. We are unable to separate material of both nominal species, determined by Loginova, and the two are here synonymized. *C. glycyrrhizae* is separated from other west Palaearctic members of the genus by the presence of a subapical band of infuscation in the forewing.



*Cyamophila medicaginis* (Andrianova)

(Figs 37–42)

*Psylla medicaginis* Andrianova, 1952: 270; Loginova, 1968: 306; 1972*b*: 141; Gegechkori, 1968: 510; 1969*b*: 723; 1970: 714; 1976: 65; Baeva & Kankina, 1971: 84; Klimaszewski, 1963: 428; 1969*a*: 47; 1973: 214; Gegechkori & Djibladze, 1976: 33. Syntypes, ♂, ♀, U.S.S.R. [not examined].

*Cacopsylla medicaginis* (Andrianova) Klimaszewski, 1975: 199.

*Cyamophila medicaginis* (Andrianova) Loginova, 1977: 582; 1981: 26; Gegechkori, 1978: 21; 1981: 121; 1984: 148.

**DESCRIPTION.** Coloration. Specimens to hand had the body, legs and antennae orange-yellow throughout. Slightly darker markings were present on dorsum of thorax.

**Structure.** Forewing (Fig. 37) oblong oval, with spinules confined to radular areas; pterostigma and costal break well-developed. Male proctiger (Fig. 39) simple; paramere (Fig. 40) parallel-sided, expanded apically into forward pointing tooth; apex of aedeagus slightly reniform. Female terminalia as in Fig. 42.

Measurements. See Table 1.

**MATERIAL EXAMINED**

2 ♂, 2 ♀, U.S.S.R.: Tabagatan, Semipal 6.vii.1962, (*Loginova*).

**HOST PLANT.** *Medicago sativa* L. and possibly *Vicia* sp.

**PUBLISHED DISTRIBUTION.** Southern U.S.S.R., 'Transcaucasus' (Gegechkori, 1968; 1969*a*; 1970; 1976; 1978; 1981; 1983*b*; 1984; Gegechkori & Djibladze, 1976), Ukrainian SSR (Klimaszewski, 1963), Pamir (Baeva & Kankina, 1971), Kazakh SSR (Andrianova, 1952; Loginova, 1972*b*), Central Asia (Gegechkori, 1984).

**COMMENTS.** This species has yet to be recorded from outside the U.S.S.R. but Klimaszewski (1969, 1975) includes it in his key to the Polish fauna on the grounds that as it occurs in the west U.S.S.R. it is likely to occur in Poland. We have followed Klimaszewski. It can be separated from the other clearwing west Palaearctic *Cyamophila* species by the following combination of characters: the lack of forewing spinules throughout the membrane, the shape of cells  $cu_{1a}$  and  $m_1$  and the shape of the male paramere and aedeagus.

*Cyamophila prohaskai* (Preisner)

(Figs 26–30, 94)

*Psylla prohaskai* Preisner, 1927: 263; Prohaska, 1928: 4; Haupt, 1935: 234; Franz, 1943: 382; Schaefer, 1949*a*: 53; 1949*b*: 31; Wagner & Franz, 1961: 167; Kuwayama & Miyatake, 1971: 52; Klimaszewski, 1973: 219. Syntypes ♂ ♀, AUSTRIA [not examined].

*Cyamophila prohaskai* (Preisner) Loginova, 1977: 582; Burckhardt, 1983: 54; Conci & Tamanini, 1986: 60.

**DESCRIPTION.** Coloration. General body colour of mature specimens orange-red with white markings on dorsum of thorax; forewing membrane clear to pale yellow, veins yellow; antennal segments 1–8 yellow, segments 3–8 infusate apically, segments 9–10 dark brown; legs orange-yellow.

**Structure.** Head (Fig. 27) with relatively long genal cones. Forewing (Fig. 26) oblong-oval, with well-developed pterostigma and costal break; spinules present throughout all cells. Metatibia with 5 thick black apical spurs; basal metatarsus with 2 spurs. Male proctiger (Fig. 28) simple, paramere (Fig. 29) gradually broadening to a truncate apex, with an anteriorly directed apical tooth; aedeagus (Fig. 30) slender, with a slightly hooked apex. Female terminalia (Fig. 94) long and slender, with dorsal margin of proctiger sinuous; circumanal pore ring small.

Measurements. See Table 1.

**MATERIAL EXAMINED**

2 ♂, 2 ♀, Switzerland (DB).

**HOST PLANT.** *Anthyllis vulneraria* L.

**PUBLISHED DISTRIBUTION.** Austria (Preisner, 1927; Prohaska, 1928; Haupt, 1935; Franz, 1943; Wagner & Franz, 1961), Italy (Conci & Tamanini, 1986), Switzerland (Schaefer, 1949*a, b*; Burckhardt, 1983).

**COMMENTS.** The record for China published by Kuwayama & Miyatake (1971) is unlikely to be correct: all other records are from the European Alps. *C. prohaskai* can be distinguished from the other west Palaearctic clearwing *Cyamophila* species by the presence of dense spinules on the forewing membrane.

*Cyamophila stoklosai* Klimaszewski & Lodos

(Figs 31–36)

*Cyamophila stoklosai* Klimaszewski & Lodos, 1979: 9. Holotype ♂, TURKEY (Lodos, Klimaszewski collection) [not examined].

Material of this species was unavailable and the following description is based entirely on information given in the original description. The drawings are derived from photomicrographs presented by Klimaszewski & Lodos (1979).

DESCRIPTION. Head and body sandy yellow with rust-coloured patches and bands; abdominal sclerites brown, intersegmental membranes yellow; genitalia slightly paler brown than rest of abdomen; forewing transparent, slightly yellowish towards apex; antennae yellow except for segments 8–10 and the apices of segments 6–7 which are brown; legs yellow with brownish patches on femur.

Structure. Head (Fig. 32) robust, genal cones short, with broadly rounded apices. Forewing (Fig. 31) oblong-oval, with well-developed pterostigma and costal break; spinules confined to the radular areas; cell  $m_1$  narrow; cell  $cu_{1a}$  high, strongly arched. Male proctiger (Fig. 33) simple; paramere (Fig. 35) with bulbous apex. Female terminalia as in Fig. 36.

Measurements. See Table 1.

HOST PLANT. *Astragalus* sp.

PUBLISHED DISTRIBUTION. Turkey (Klimaszewski & Lodos, 1979).

**Table 1** Measurements of *Acizzia* and *Cyamophila* species. Males and females are given separately and all values are in mm.

		Head width	Antennal length	Forewing length	Female proctiger length	Male proctiger length	Male paramere length	Male aedeagus length
<i>Acizzia bicolorata</i>	m	0.54	0.93	1.50	—	0.18	0.18	0.16
	f	—	—	—	—	—	—	—
<i>hollisi</i>	m	0.57–0.65	1.00–1.14	1.63–1.83	—	0.20–0.23	0.17–0.24	0.15–0.19
	f	0.61–0.65	1.05–1.22	1.92–2.12	0.55–0.88	—	—	—
<i>uncatoides</i>	m	0.59–0.63	0.79–0.96	1.67–1.80	—	0.28–0.29	0.21–0.22	0.20–0.21
	f	0.58–0.61	0.83–0.88	1.80–1.91	0.35–0.39	—	—	—
<i>acaciae-baileyanae</i>	m	0.34–0.42	0.55–0.60	1.17–1.24	—	0.12–0.14	0.12–0.13	0.12–0.13
	f	0.37–0.44	0.60–0.64	1.30–1.61	0.30–0.31	—	—	—
<i>Cyamophila glycyrrhizae</i>	m	0.78–0.80	0.90–0.96	2.20–2.31	—	0.33–0.35	0.29–0.31	0.28–0.29
	f	0.79–0.81	1.00–1.10	2.30–2.32	0.70–0.72	—	—	—
<i>medicaginis</i>	m			not available				
	f							
<i>prohaskai</i>	m	0.75–0.78	1.07–1.10	2.42–2.44	—	0.31–0.33	0.26–0.27	0.27–0.29
	f	0.81–0.83	1.13–1.16	2.63–2.64	0.86–0.89	—	—	—
<i>stoklosai</i>	m	0.62	0.98	1.68	—	0.32	0.24	—
	f	0.66	1.10	1.98	0.66	—	—	—

**ARYTAINA** Förster

*Arytaina* Förster, 1848: 69; Pflugfelder, 1941: 76. Type-species: *Psylla spartii* Hartig, 1841 (= *Psylla genistae* Latreille, 1804), designated by Oshanin, 1912: 128.

*Amblyrhina* Löw, 1879: 599; 1888b: 382; Kieffer, 1905: 165; Heslop-Harrison, 1951: 425; Loginova, 1976a: 598; Hodkinson & White, 1979a: 59. Type-species: *Psylla torifrons* Flor, 1861, by monotypy. **Syn. n.** *Psyllopa* Crawford, 1911: 628. Type-species: *Psyllopa magna* Crawford, by original designation. [Synonymised by Crawford, 1914: 122.]

**DIAGNOSIS.** Head weakly deflexed, genal cones short and broad, with broadly rounded apices, in approximately same plane as vertex. Pronotum broad and flat, propleurites quadrate, divided by a vertical suture. Forewing oval to elongate-oval, usually broadest at or before middle; pterostigma and costal break absent; cell  $cu_{1a}$  low and rarely slanting towards base of wing. Basal metatarsus with one black spur. Male proctiger without posterior lobe; paramere broad with truncate apex, terminated by a characteristic anteriorly directed tooth; aedeagus with a strongly hooked apex. Associated with legumes of the tribe Genisteae.

**COMMENTS.** *Arytaina* is a monophyletic genus of 11 species associated with host-plants of the legume tribe Genisteae within the Mediterranean Basin. It contains the original core species related to the type-species plus most species hitherto referred to *Amblyrhina*. The synonymy given relates only to references not quoted under the individual species synonymies and to papers that deal specifically with the generic synonymy. Unfortunately *Arytaina* had become a holding genus for many other species, outside the area under study, which are unrelated to the type-species and it is necessary to reallocate these species, where possible, to other genera (see Hodkinson, 1983; Hodkinson & White, 1981; Jensen, 1957b; Tuthill, 1943; Mathur, 1975; Capener, 1970). The following species are here transferred to other genera as follows.

*Acizzia obscura* (Crawford, 1912; from *Psyllopa*). **Comb. n.**

= *A. spinosa* (Mathur, 1975; from *Arytaina*). **Syn. n., Comb. n.**

*A. albizziae* (Yang, 1984; from *Arytaina*). **Comb. n.**

*Arytainilla devia* (Loginova, 1976; from *Arytaina*). **Comb. n.** (see p. 42).

*A. nubivaga* (Loginova, 1976b; from *Arytaina*). **Comb. n.** (see p. 42).

*Ceanothia assimilis* (Crawford, 1914; from *Arytaina*). **Comb. n.**

*C. bicolor* (Jensen, 1957b; from *Arytaina*). **Comb. n.**

*C. boharti* (Jensen, 1957b; from *Arytaina*). **Comb. n.**

*C. essigi* (Jensen, 1957b; from *Arytaina*). **Comb. n.**

*C. insolita* (Tuthill, 1943; from *Arytaina*). **Comb. n.**

*C. mitella* (Jensen, 1957b; from *Arytaina*). **Comb. n.**

*Euphalerus isitis* (Cotes, 1893; from *Psylla*). **Comb. n.**

*E. punctinervis* (Crawford, 1919; from *Arytaina*). **Comb. n.**

*Euryconus pulchra* (Crawford, 1919; from *Arytaina*). **Comb. n.**

*Insnesia brevigena* (Crawford, 1919; from *Arytaina*). **Comb. n.**

*I. crawfordi* **nom. n.**

= *I. pulchra* (Crawford, 1920; from *Arytaina*). **Comb. n.** (homonym of *Arytaina pulchra* Crawford, 1919).

*I. flava* (Crawford, 1919; from *Arytaina*). **Comb. n.**

*I. iolani* (Crawford, 1919; from *Arytaina*). **Comb. n.**

*I. meridionalis* (Crawford, 1919; from *Arytaina*). **Comb. n.**

*I. thakrei* (Mathur, 1973; from *Arytaina*). **Comb. n.**

*I. tuberculata* (Crawford, 1917; from *Arytaina*). **Comb. n.**

*I. uichancoi* (Braza & Calilung, 1981; from *Arytaina*). **Comb. n.**

*I. variabilis* (Crawford, 1917; from *Arytaina*). **Comb. n.**

*Peripsyllopsis ramakrishni* (Crawford, 1912). **Stat. rev., Comb. rev.**

*Retroacizzia mopanei* (Pettey, 1924; from *Arytaina*). **comb. n.**

= *R. antennata* Heslop-Harrison, 1961b. **Syn. n.**

*Spanioneura turkiana* (Klimaszewski & Lodos, 1977; from *Amblyrhina*). **Comb. n.**

*S. pechai* (Klimaszewski & Lodos, 1977; from *Amblyrhina*). **Comb. n.**

*Arytaina virgata* Caldwell, 1944 and *A. cornicola* Frauenfeld, 1896 are both regarded here as nomina dubia, while *A. fasciata* Laing, 1930 remains the sole species which cannot be assigned to another genus at present.

### Key to species

- 1 Forewing (Fig. 43) with cell  $m_{1+2}$  elongate, as long as stem of vein *M*. Cell  $cu_{1a}$  narrowly triangular, veins  $Cu_{1a}$  and  $Cu_{1b}$  almost straight ..... ***longicella* sp. n.** (p. 16)
- Forewing (Figs 45, 51, 57) with cell  $m_{1+2}$  much shorter than length of vein *M*. Cell  $cu_{1a}$  not narrowly triangular, veins  $Cu_{1a}$  and  $Cu_{1b}$  more distinctly curved ..... 2



- 2 Cells of forewing with distinct longitudinal brown or black pattern extending backwards from the apex (Figs 45, 47, 49) ..... 3
- Cells of forewing without distinct longitudinal patterning (in *atlasiensis*, *adenocarpi* and *angustatipennis* (Figs 53, 61, 51) there is occasionally a faint clouding of the wing membrane and in the former this is accompanied by the presence of diffuse spots in the apical cells) ..... 5
- 3 Forewing (Fig. 45) with costal margin comparatively straight, surface spinules present throughout cell  $r_1$ . Genal cones (Fig. 46) broad with rounded apex. Male paramere (Fig. 66) comparatively short and broad. Aedeagus as in Fig. 67 ..... *genistae* (Latreille) (p. 14)
- Forewing (Figs 47, 49) with costal margin more strongly curved; surface spinules absent throughout most of cell  $r_1$ . Genal cones either broad with an angular apex (Fig. 48) or more slender with rounded apex (Fig. 50). Paramere relatively longer and narrower (Fig. 69, 72). Aedeagus as in Figs 70, 73 ..... 4
- 4 Forewing (Fig. 49) with surface spinules absent from cell  $c+sc$  and the base of  $r_1$ , and confined to narrow bands in the centres of cells  $r_3$  and  $m$ . Genal cones (Fig. 50) slender, with rounded apex. Male paramere and aedeagus as in Figs 71–73. Spain and Sicily
- Forewing (Fig. 47) with spinules present throughout cells  $c+sc$  and  $r_1$  and broadly distributed throughout cells  $r_3$  and  $m$ . Genal cones (Fig. 48) broader and with a more angular apex. Male paramere and aedeagus as in Figs 68–70. Eastern Europe
- *maculata* (L ow) (Spanish material) (p. 16)
- *maculata* (L ow) (Hungarian material) (p. 16)
- 5 Forewing (Fig. 51) strongly narrowed to an acute apex. Female proctiger (Fig. 101) long and slender, with a relatively small circumanal pore ring ..... *angustatipennis* (Loginova) (p. 14)
- Forewing (Figs 55, 59, 61) less strongly narrowed, apex more broadly rounded. Female proctiger (Figs 92, 99, 100) less slender, relatively shorter or more robust, with a relatively longer circumanal pore ring ..... 6
- 6 Forewing shaped as in Fig. 53 with cell  $c+sc$  somewhat bowed outwards, vein  $Cu_{1b}$  strongly curved before its junction with the anal margin; nebulous brown spots present on membrane around the apex. (N.B. Several other species have dark spots where the longitudinal veins meet the marginal vein.) ..... *atlasiensis* sp. n. (p. 14)
- Forewing (Figs 55, 59, 61) of different shape, without nebulous brown spots on membrane around apex (if pattern present as in *A. torifrons* (Fig. 57) then never consisting of spots); vein  $Cu_{1b}$  less strongly curved before its junction with the marginal vein ..... 7
- 7 Forewing (Figs 55, 57) opaque amber or yellow-brown throughout or with suffused brown markings along veins around apex ..... 8
- Forewing (Figs 59, 61) not amber or yellow-brown, and without brown patterning along vein margins and around apex ..... 9
- 8 Forewing (Fig. 55) elongate oval, amber or yellow-brown throughout. Genal cones (Fig. 56) short with a broad base and a very broadly rounded apex. Male paramere (Fig. 74) less broad. Apex of aedeagus (Fig. 81) more strongly hooked ..... *putonii* (L ow) (p. 17)
- Forewing (Fig. 57) more broadly oval, shorter, not amber or yellow-brown throughout; pattern somewhat variable but usually consisting of suffused brown markings along vein margins and around apex. Genal cones (Fig. 58) slightly longer and less broadly rounded at apex. Male paramere (Fig. 83) broader. Apex of aedeagus (Fig. 80) less strongly hooked
- *torifrons* (Flor) (p. 18)
- 9 Forewing (Fig. 59) broadest in basal third, with a narrowly rounded apex; vein  $Cu_{1a}$  weakly arched. Male paramere (Fig. 83) with a subapical lobe on the anterior margin. Aedeagus (Fig. 84) with a weakly curved tip ..... *hispanica* sp. n. (p. 16)
- Forewing (Figs 61, 257) broadest towards the centre, with a more broadly rounded apex and with vein  $Cu_{1a}$  more strongly arched. Male paramere (Figs 74, 86, 89) without a subapical lobe on the anterior margin. Aedeagus (Figs 87, 90) usually with a strongly recurved tip ..... 10
- 10 Male paramere (Fig. 74) almost as long as proctiger, with at most a short anteriorly directed apical tooth. Genal cones (Fig. 258) apparently much shorter. (Figures and description taken from the original, all type material is lost.) Libya ..... *africana* Heslop-Harrison (p. 13)
- Male paramere (Figs 86, 89) distinctly shorter than the length of the proctiger, with a large apical tooth. Genal cones (Figs 62, 64) longer, with broadly rounded apices. France, Portugal and Spain ..... 11
- 11 Forewing (Fig. 63) with dense spinules broadly distributed throughout all cells. Head (Fig. 64) more robust, vertex relatively long. Male paramere (Fig. 89) with a distinct anterior bulge at mid length and with a sinuously truncated apex which is developed anteriorly into a massive

tooth. Male aedeagus as in Fig. 90. Antennae more than twice as long as head width

- Forewing (Fig. 61) with less dense spinules which are confined to the apical areas of cells  $r_1$ ,  $r_s$ ,  $m$ ,  $m_{1+2}$ ,  $cu_{1a}$ , the base of  $c+sc$  and around vein  $Cu_2$ . Head (Fig. 62) less robust, vertex relatively shorter. Male paramere (Fig. 86) more regularly shaped, curved posteriorly and with a smoothly convex apex which is developed anteriorly into a large but shorter tooth. Male aedeagus as in Fig. 87. Antennae less than twice head width ..... *adenocarpi* Löw (p. 13)

*magnidentata* sp. n. (p. 17)

### *Arytaina adenocarpi* Löw

(Figs 61, 62, 85–87, 99)

*Arytaina adenocarpi* Löw, 1880: 552; 1883: 230; 1885: 150; Puton, 1886: 92; Aulman 1913: 32; Fuente, 1920: 321; Heslop-Harrison, 1951: 434; Ramirez Gomez, 1956: 75; Klimaszewski, 1973: 191; Loginova, 1976a: 598; Conci & Tamanini, 1984b: 262. Lectotype ♂, FRANCE, here designated (NM).

*Arytaena adenocarpi* Löw; Oshanin, 1907: 366; 1912: 128.

DESCRIPTION. Coloration. All the available specimens are immature. General coloration of head, thorax and abdomen and appendages bright green, occasionally orange-yellow; often with orange markings on dorsum of head, thorax and abdomen; forewing clear, occasionally with faint brownish clouds; veins yellow to brown, always much darker at the points where they meet the marginal vein.

Structure. Head (Fig. 62) with genal cones swollen, with rounded apices. Forewing (Fig. 61) elongate oval; spinules sparse and confined to wing apex, the base of cell  $c+sc$  and around vein  $Cu_2$ ; pterostigma and costal break absent; cell  $m_1$  of normal size, vein  $Cu_{1a}$  strongly curved. Metatibia with 5 thick black spurs; metatarsus with 1 black spur. Male proctiger (Fig. 85) simple; paramere (Fig. 86) parallel-sided, curved posteriorly in apical half, with a large inner apical tooth projecting anteriorly; aedeagus (Fig. 87) with moderately strongly hooked apex. Female terminalia as in Fig. 99.

Measurements. See Table 2.

#### MATERIAL EXAMINED

Lectotype ♂, France: 'Gallia, Landes. Type v. *Aryt. adenocarpi* Löw' (NM). Paralectotype ♀, same data as lectotype. 7 ♂, 6 ♀, Portugal and France: 'Haute Pyrenees' (BMNH). In addition there is an abundance of material in the BMNH, presumably collected by Heslop-Harrison in Spain or Portugal, which does not bear data labels.

HOST PLANTS. *Adenocarpus complicatus* (L.) Gay and *Adenocarpus hispanicus* (Lam.) D.C. in Lam. & D.C.

PUBLISHED DISTRIBUTION. France (Löw, 1880; Aulmann, 1913), Spain (Fuente, 1920; Ramirez Gomez, 1956), Italy (Conci & Tamanini, 1984b).

COMMENTS. This species is closest to *A. magnidentata*. It can be separated by the form of the forewing spinule pattern and the shape of the male paramere and aedeagus.

### *Arytaina africana* Heslop-Harrison

(Figs 74, 257, 258)

*Arytaina africana* Heslop-Harrison, 1951: 438; Loginova, 1972a: 16; 1976a: 598. Syntypes ♂ and ♀, LIBYA [not traced].

DESCRIPTION. Coloration. According to Heslop-Harrison this is a 'greenish or yellowish-brown insect with darker brown markings on the head and thorax, and brown maculations on the forewings; strongly resembling *A. genistae* in general appearance'.

Structure. Head (Fig. 258) with short genal cones. Forewing oval, cells  $m_1$  and  $m_2$  of moderate size, vein  $Cu_{1a}$  strongly arched; spinules present throughout all cells; pterostigma and costal break absent. Male proctiger (Fig. 74) simple; paramere (Fig. 74) long, parallel-sided, with a truncate apex. Shape of aedeagus and of female terminalia unknown.

Measurements. See Table 2.

HOST PLANT. 'A yellow flowered broom' (Heslop-Harrison, 1951).

PUBLISHED DISTRIBUTION. Libya (Heslop-Harrison, 1951) and possibly Morocco, although the specimens identified as this species by Loginova (1972) do not fit the original description very well.

COMMENTS. All type material of this species appears to be lost and we have seen no other authentic material. Our account is based entirely on Heslop-Harrison's original description. *A. africana* appears closest to *A. genistae* but the male paramere is more slender and the genal cones are less massive.

***Arytaina angustatipennis* (Loginova) comb. n.**

(Figs 51, 52, 81, 101)

*Amblyrhina angustatipennis* Loginova, 1972: 24; Loginova, 1976a: 598. Holotype ♂, MOROCCO (ZMU) [examined].

DESCRIPTION. Coloration. Dorsal surface of head and thorax brownish yellow with longitudinal reddish brown and orange markings; genal cones dirty yellow; abdominal sclerites reddish brown, darker above, intersegmental membranes yellow; genitalia yellowish brown; forewing membrane clear to very pale yellow; veins yellow basally, becoming dark brown apically; radular spinules prominent, forming dark brown spots at the wing margin; antennae yellow basally, darkening towards the apex; legs brownish yellow.

Structure. Head (Fig. 52) with vertex very short but broad; genal cones short and very broadly rounded. Forewing (Fig. 51) broadest in basal third, tapered to a narrow acute apex; spinules confined to the radular areas; cells  $m_1$  and  $cu_{1a}$  of normal size; vein  $Cu_{1a}$  strongly curved; pterostigma and costal break absent. Metatibia with 5 thick black apical spurs; basal metatarsus with 2 spurs. Male proctiger (Fig. 81) simple; paramere (Fig. 81) parallel-sided with a truncate apex. Female terminalia (Fig. 101) long and slender.

Measurements. See Table 2.

MATERIAL EXAMINED

Holotype ♂, **Morocco**: Atlas Mountains, Reraia, 5–15.vi.1926 (*Lindberg*) (ZMU). Paratypes, 1 ♂, 1 ♀, same data as holotype.

HOST PLANT. Unknown.

PUBLISHED DISTRIBUTION. Morocco (Loginova, 1972).

COMMENT. This species is separated from other members of the genus by the apically tapered forewing.

***Arytaina atlasiensis* sp. n.**

(Figs 53, 54, 91)

DESCRIPTION. Coloration. Dorsal surface of head and thorax dirty yellow, with orange or reddish brown markings; genal cones yellow. Abdominal sclerites dark brown to black; intersegmental membranes yellow; genitalia dark brown to black; forewing membrane clear to pale yellow, veins concolorous; nebulous small brownish spots present towards wing apex; antennal segments 1–4 yellow; remainder dark brown; legs orange-yellow.

Structure. Head (Fig. 54) robust, genal cones short but massive, with broadly rounded apices. Forewing (Fig. 53) broadly oval, with cell  $c+sc$  bulging outwards; costal break and pterostigma absent; vein  $R_1$  reaching wing margin at or about the centre of the wing; cell  $m_1$  narrow; cell  $cu_{1a}$  more strongly arched than normal; vein  $Cu_{1b}$  strongly recurved as it approaches wing margin; spinules confined to cells in basal half of wing. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 spur. Male unknown. Female terminalia (Fig. 91) long and robust.

Measurements. See Table 2.

Holotype ♀, **Morocco**: Middle Atlas, 18.v.1961 (*Lawrence*) (BMNH).

Paratypes. 3 ♀, same data as holotype.

HOST PLANT. Unknown.

COMMENTS. This species appears to be closest to *A. genistae* and *A. maculata* but can be distinguished by the characteristic shape and pattern of the forewing.

***Arytaina genistae* (Latreille)**

(Figs 45, 46, 65–67, 96)

*Sylla genistae* Latreille, 1804: 382; Guérin, 1843: 370; Burmeister, 1843: 139; Bolivar & Chicote, 1879: 183; Reiber & Puton, 1880: 75. Syntypes ♂, ♀, FRANCE [not traced].



*Psylla ulicis* Curtis, 1835: 565 (22a); Löw, 1883: 252. Syntypes [incomplete data], GREAT BRITAIN (UMM). [Synonymised by Löw, 1877: 126.]

*Psylla spartii* Hartig, 1841: 375; Förster, 1848: 69; Lethierry, 1874: 86; Löw, 1877: 126; 1883: 251; Flor, 1861: 358; Szulczewski, 1927: 199. Type [incomplete data], GERMANY; Berlin. [Synonymised by Löw, 1877: 126.]

*Arytaina spartii* (Hartig) Förster, 1848: 69; Löw, 1877: 126; Meyer-Dur, 1871: 404.

*Psylla genistae* Fabricius; Lethierry, 1869: 365. [Fabricius reference not traced.]

*Arytaena ulicis* (Curtis) Scott, 1876: 529.

*Chermes (Ataenia) genistae* (Latreille) Thomson, 1877: 828.

*Chermes genistae* (Latreille) Douglas, 1878: 41.

*Arytaena genistae* (Latreille) Löw, 1879: 597; Scott, 1880: 132; 1882a: 14; 1882b: 255; Reuter, 1881: 162; Edwards, 1896: 250; Oshanin, 1907: 366; 1912: 128; Heslop-Harrison, J. W., 1915: 401; Van der Goot, 1912: 284; Britten, 1930: 75; Wahlgren, 1934: 89; Haupt, 1935: 241; Murray, 1936: 138; Schaefer, 1949a: 54; 1949b: 31; Vondráček, 1951b: 128; Smreczynski, 1954: 141; Glowacka & Harisanov, 1983: 64.

*Arytaina genistae* (Latreille) Löw, 1883: 239; 1884: 149; 1888a: 19; Puton, 1886: 92; Hueber, 1904: 275; Heslop-Harrison, 1937: 2; 1951: 428; Lauterer, 1971: 197; Loginova, 1976a: 598. (All other references listed under distribution refer to *Arytaina genistae* unless listed above.)

*Psyllopa magna* Crawford, 1911: 628. Syntypes ♂, ♀, U.S.A. [Synonymised by Crawford, 1914: 126.]

*Arylaina genistae* (Latreille) Halbert, 1934: 310. [Mis-spelling.]

**DESCRIPTION.** Coloration. Immature specimens with body coloration bright green often with orange or brown markings on the dorsum. Mature specimens with dorsal surface of head and thorax yellowish white with extensive longitudinal brown or orange-brown markings; genal cones yellowish white; abdominal sclerites dark brown to black; intersegmental membranes yellow; genitalia dark brown; forewing membrane clear with brown or sometimes greyish longitudinal pattern; veins brown; antennal segments 1–5 brownish yellow, remainder dark brown; legs dirty yellow, usually with femora darkened above.

**Structure.** Head (Fig. 46) moderately robust, genal cones short and moderately broadly rounded. Forewing (Fig. 45) oval, pterostigma and costal break absent; spinules present in all cells; cells  $m_1$  and  $cu_{1a}$  of average size for genus; vein  $cu_{1a}$  strongly curved. Metatarsus with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 65) simple; paramere (Fig. 66) relatively broad, parallel-sided with a truncate apex which is developed into an anteriorly directed tooth; aedeagus (Fig. 67) with strongly hooked apex. Female terminalia as in Fig. 96.

Measurements. See Table 2.

#### MATERIAL EXAMINED

The material is too extensive to list. It includes all the material in the BMNH, together with material in the collections of IDH and DB.

**HOST PLANTS.** Occurs primarily on *Cytisus scoparius* (L.) Link but is also recorded in the literature from *Chamaecytisus austriacus* (L.) Link, *Chamaecytisus heuffelii* (Wierzb.) Rothm. and *Genista tinctoria* L. These published records require confirmation as they may reflect the confusion between this species and *A. maculata*.

**PUBLISHED DISTRIBUTION.** Austria (Löw, 1888a), Bulgaria (Glowacka & Harisanov, 1983), Czechoslovakia (Löw, 1888a; Duda, 1892; Šulc, 1905a; Vondráček, 1957; Lauterer, 1977), Denmark (Jacobsen, 1919), France (Lethierry, 1869; Reiber & Puton, 1880; Carpentier & Dubois, 1892; Dominique, 1902; Lambertie, 1910), Great Britain (Scott, 1880; Edwards, 1896; Britten, 1930; Heslop-Harrison, J. W., 1915; Heslop-Harrison, 1936a, b, c; Murray, 1936; Ing, 1966; 1971; 1974; Watmough, 1968a, b; Hodkinson, 1976; 1978; Hodkinson & White, 1979b; White & Hodkinson, 1982), German D.R. (Lauterer, 1966; Emmrich, 1976; 1978), German F.R. (Förster, 1848), Ireland (Halbert, 1935), Italy (Ferrari, 1888), Netherlands (Van der Goot, 1912; Blöte, 1926), Poland (Szulczewski, 1927; Smreczynski, 1954; Klimaszewski, 1961; 1967; 1969a; 1971; 1973; 1975; 1979; Zgardinska, 1976; Glowacka, 1979), Spain (Bolivar & Chicote, 1879; Vondráček, 1951b), Sweden (Reuter, 1881; Wahlgren, 1934; Ossiannilsson, 1952; 1971), Switzerland (Schaefer, 1949a, b; Burckhardt, 1983), Rumania (Dobreanu & Manolache, 1962), U.S.A. (introduced) (Crawford, 1914; Van Duzee, 1917; Tuthill, 1943; Vondráček, 1953).

**COMMENTS.** Early records of this species from Hungary have been shown to relate to *A. maculata* Löw (Horvath, 1918). The two species are easily confused and the records given above should be treated with care, particularly those for eastern Europe and Italy where their ranges appear to overlap. The two species can be distinguished by the shape of the forewing and the form of the male genitalia.

*Arytaina hispanica* sp. n.

(Figs 59, 60, 82–84, 92)

DESCRIPTION. Coloration. Dorsal surface of head and thorax brownish yellow with darker brown longitudinal markings; abdominal sclerites dark brown above, paler beneath; intersegmental membranes dull yellow; genitalia yellow-brown to brown; forewing membrane very pale yellowish orange; veins concolorous; antennal segments 1–2 yellow; segments 3–4 yellow basally, infuscate apically; segments 5–10 brown; legs brownish yellow.

Structure. Head (Fig. 60) with genal cones shorter than vertex and broadly rounded at apex. Forewing (Fig. 59) semi-opaque, broadest towards base, tapering to narrowly rounded apex; veins thick; spinules dense and present in all cells; cell  $m_1$  of average size; cell  $cu_{1a}$  small with vein  $Cu_{1a}$  weakly curved. Metatibia with 5 thick black apical spurs; metatarsus with 1 black spur. Male proctiger (Fig. 82) simple; paramere (Fig. 83) with distinct subapical bulge on anterior margin; aedeagus (Fig. 84) weakly hooked at apex. Female terminalia as in Fig. 92.

Measurements. See Table 2.

Holotype ♂, **Spain**: Sierra Nevada, Loma del Mulhacen, 3200 m, 30.viii.1975 (*Barfuss*) (ETH).

Paratypes. 6 ♀, same data as holotype.

HOST PLANT. Undetermined '*Genista*' species.

COMMENTS. This species has the short, oval wing as found in *A. torifrons* but in other respects resembles species such as *A. adenocarp*i. The form of the male genitalia is characteristic.

*Arytaina longicella* sp. n.

(Figs 43, 44, 95)

DESCRIPTION. Coloration. The type specimen is probably immature. General colour of body and appendages dull dirty yellow throughout (possibly greenish in life). Forewing membrane very pale yellow, slightly opaque; veins dull yellow.

Structure. Head (Fig. 44) with genal cones shorter than vertex, very broad and truncate at the apex. Forewing (Fig. 43) oval with narrowly rounded apex; lacking spinules except in radular areas and around vein  $Cu_2$ ; cell  $m_1$  very long and narrow; cell  $cu_{1a}$  triangular, vein  $Cu_{1a}$  straight; pterostigma and costal break absent. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Female terminalia as in Fig. 95. Male unknown.

Measurements. See Table 2.

Holotype ♀, **Spain**: Sierra de Guadarrama, vii.1926 (*Uvarov*) (BMNH).

HOST PLANT. Unknown.

COMMENTS. This species is based on a single female but the wing venation is so different it should not be confused with other species.

*Arytaina maculata* (Löw) comb. n.

(Figs 47–50, 68–73, 97)

*Amblyrhina maculata* Löw, 1886: 157; 1888b: 382; Horvath, 1886: 313; 1918: 58; Puton, 1886: 92; Ragusa, 1907: 237; Oshanin, 1907: 366; 1912: 128; Aulmann, 1913: 32; Haupt, 1935: 241; Vondráček, 1951b: 128; 1957: 180; Klimaszewski, 1969b: 44; 1970: 422; 1973: 189; 1975: 129; Loginova, 1964: 464; 1976a: 598; Lauterer, 1977: 98; Dobreanu & Manolache, 1962: 147; Andrianova & Klimaszewski, 1983: 38; Glowacka & Harisanov, 1983: 64. Syntypes ♂, ♀ HUNGARY (not located).

*Ambly[r]rhina maculata* Löw; Löw, 1888a: 19.

[*Arytaina genistae* (Latreille), partim; Löw, 1888a: 19; Horvath, 1886: 314; 1918: 58. Misidentifications.]

*Amblyrhina maculosa* Löw; Klimaszewski, 1965. [Mis-spelling.]

DESCRIPTION. Coloration. Immature specimens with body colour bright green throughout. Mature specimens with genal cones, vertex and dorsal part of thorax yellowish white with light brown and orange markings; underside of head and thorax yellow with dark brown markings; abdominal sclerites dark brown to black, intersegmental membranes orange-yellow; genitalia orange-yellow to dark brown; forewing membrane clear with brown or sometimes greyish longitudinal pattern; veins brown; antennal segments 1–5 yellow, 5–10 dark brown; femora dark brown above, remainder of legs dirty yellow.



Structure. Head (Figs 48, 50) with genal cones shorter than vertex, broad; more slender in the Spanish specimens. Forewing (Figs 47, 49) oval, without pterostigma or costal break; with spinules present throughout all cells except for  $r_1$ , where they are at most confined to the apex; in the Spanish material they are also absent from cell  $c+sc$ ; cells  $m_1$  and  $cu_{1a}$  of average size, vein  $Cu_{1a}$  strongly curved. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 68) simple; paramere (Fig. 69) parallel-sided, truncate, with apical forward-pointing tooth; aedeagus (Fig. 70) strongly hooked. In Spanish males the paramere is more slender (Figs 71–73). Female terminalia as in Fig. 97.

Measurements. See Table 2.

#### MATERIAL EXAMINED

The only material in the Löw collection comes from a different locality to that stated in the original description. 1 ♂, 1 ♀, **Hungary**: Szomotor (det. Löw) (NM). 4 ♂, 8 ♀ **Italy** and **Spain** (BMNH, PL).

HOST PLANTS. *Chamaecytisus ratisbonensis* (Schaeffer) Rothm. and *Chamaecytisus borysthenicus* (Gruner) A. Klaskova.

PUBLISHED DISTRIBUTION. Bulgaria (Klimaszewski, 1965, 1970; Glowacka & Harisanov, 1983), Czechoslovakia (Vondráček, 1957; Lauterer, 1977), Hungary (Löw, 1886, 1888a; Horvath, 1886, 1918a; Haupt, 1935), Italy, Sicily (Ragusa, 1907), Rumania (Dobreaun & Manolache, 1962), U.S.S.R.; central and southern European part (Loginova, 1964; Andrianova & Klimaszewski, 1983), Yugoslavia (Horvath, 1918b).

COMMENTS. This species is very close to *A. genistae* with which it has been confused in the past. It is possible that some of the published records for *A. genistae* refer to this species. The specimens from Sicily have slightly more slender genal cones and parameres than Löw's material from Austria. Similarly the Spanish material listed is included under *maculata* primarily because of the similarity of the wing pattern. In several other respects such as the shape of the genae and parameres it is close to *adenocarpi*. This whole group warrants further detailed investigation. The *maculata* complex is similar in several respects to *A. genistae* but can be distinguished by the shape of the forewing and the form of the male genitalia.

### *Arytaina magnidentata* sp. n.

(Figs 63, 64, 88–90)

DESCRIPTION. Coloration. Unknown; the type-material is slide mounted. Forewing clear, without pattern on membrane but veins darkened at the point where they meet the marginal vein.

Structure. Head (Fig. 64) robust, genal cones large and broadly rounded at apex, slightly shorter than length of vertex. Forewing (Fig. 63) oval, without pterostigma or costal break; dense spinules present throughout all cells; cells  $m_1$  and  $cu_{1a}$  of average size for genus; vein  $Cu_{1a}$  strongly curved. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 88) simple; paramere (Fig. 89) with a massive apical tooth; aedeagus (Fig. 90) with a very strongly hooked apex. Female unknown.

Measurements. See Table 2.

Holotype ♂, **Portugal**: Rio Mandego, vii.1953 (*Heslop-Harrison*) (BMNH).

HOST PLANT. Unknown.

COMMENTS. Although based on a single male this species is quite distinct from other *Arytaina* species. It is closest to the other clear elongate-oval winged species, *A. adenocarpi*, but differs in characters of the forewing and the shape of the male paramere and aedeagus.

### *Arytaina putonii* (Löw) comb. n.

(Figs 55, 56, 75–77, 100)

*Amblyrhina putonii* Löw, 1888b: 381; Aulmann, 1913: 32. Syntypes ♂, ♀, FRANCE (missing from Löw collection).

*Amblyrhina putoni* Löw; Puton, 1899: 113; Oshanin, 1907: 365; 1912: 128; Lambertie, 1910: 96; Vondráček, 1951b: 128; Klimaszewski, 1973: 190; Loginova, 1976a: 598.

DESCRIPTION. Coloration. General body coloration bright green with orange markings on the dorsum of the head, thorax and abdomen; forewing membrane amber coloured, slightly darker towards apex, veins concolorous; antennal segments 1–2 green; segments 3–6 yellowish brown, becoming infuscate towards the apex; segments 7–10 brown; legs greenish yellow.



Structure. Head (Fig. 56) short and broad; genal cones very broad basally and appearing to curve round to give broadly truncate apices. Forewing (Fig. 55) short and oval, of somewhat rugose texture, narrowly rounded at apex; spinules absent except from radular areas; cells  $m_1$  and  $cu_{1a}$  of average size, vein  $Cu_{1a}$  weakly curved to straight; costal break and pterostigma absent. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 75) simple; paramere (Fig. 76) parallel-sided with large apical anteriorly directed tooth; aedeagus (Fig. 77) with hooked apex. Female terminalia as in Fig. 100.

Measurements. See Table 2.

#### MATERIAL EXAMINED

10 ♂, 7 ♀, Portugal and Spain (BMNH).

HOST PLANT. Recorded by Löw (1888) from '*Cytisus spinosus*' which, in all probability, is *Calicotome spinosa* (L.) Link.

PUBLISHED DISTRIBUTION. France (Löw, 1888*b*; Lambertie, 1910; Aulmann, 1913; Vondráček, 1951*b*).

COMMENTS. This species is closest to *A. torifrons* but differs in the shape and coloration of the forewing, the shape of the genal cones and the form of the male aedeagus and paramere.

**Table 2** Measurements of *Arytaina* species. Males and females are given separately and all values are in mm.

		Head width	Antennal length	Forewing length	Female proctiger length	Male proctiger length	Male paramere length	Male aedeagus length
<i>adenocarpis</i>	m	0.77-0.83	1.38-1.59	1.91-2.19	—	0.39-0.42	0.31-0.32	0.28-0.30
	f	0.80-0.89	1.55-1.65	2.14-2.45	0.76-0.85	—	—	—
<i>africana</i>	m	0.78	—	2.38	—	—	—	—
	f	—	—	(data from original description)	—	—	—	—
<i>angustatipennis</i>	m	—	—	2.57	—	0.25?	0.20?	—
	f	0.92-0.98	1.65-1.70	2.70-2.82	0.62-0.80	—	—	—
<i>atlasensis</i>	m	—	—	unknown	—	—	—	—
	f	1.00-1.02	1.56-1.58	2.54-2.56	0.89-0.97	—	—	—
<i>genistae</i>	m	0.90-0.96	2.05-2.20	2.35-2.75	—	0.39-0.44	0.37-0.39	0.30-0.32
	f	0.95-1.05	1.90-2.25	2.40-3.00	0.89-0.99	—	—	—
<i>hispanica</i>	m	0.85	—	2.01	—	0.38	0.31	0.31
	f	0.86-0.90	1.27-1.29	2.32-2.34	0.85-0.86	—	—	—
<i>longicella</i>	m	—	—	unknown	—	—	—	—
	f	0.83	—	2.34	0.96	—	—	—
<i>maculata</i>	m	0.86	1.68	2.35	—	0.39	0.33	0.33
	f	0.86	1.46	2.35	0.91	—	—	—
<i>magnidentata</i>	m	0.79	1.61	2.12	—	0.37	0.33	0.27
	f	—	—	unknown	—	—	—	—
<i>putonii</i>	m	0.81-0.86	1.10-1.14	1.90-2.03	—	0.36-0.38	0.31-0.32	0.30-0.31
	f	0.86-0.93	1.15-1.16	2.09-2.20	0.72-0.80	—	—	—
<i>torifrons</i>	m	0.73-0.75	0.85-0.95	1.55-1.59	—	0.34-0.36	0.25-0.27	0.26-0.28
	f	0.70-0.83	0.85-1.00	1.68-2.02	0.64-0.71	—	—	—

#### *Arytaina torifrons* (Flor) comb. n.

(Figs 57, 58, 78-80, 102)

*Psylla torifrons* Flor, 1861: 360. LECTOTYPE ♂, FRANCE (NM), here designated [examined].

[*Psylla spartiophila* Förster sensu Puton, 1871: 437. Misidentification.]

*Amblyrhina torifrons* (Flor) Löw, 1879: 600; 1882*b*: 259; 1883: 252; 1888*b*: 382; Puton, 1886: 92; Oshanin, 1907: 365; 1912: 128; Aulmann, 1913: 32; Klimaszewski, 1973: 190; Loginova, 1976*a*: 598; Hodkinson & White, 1979*a*: 59.

DESCRIPTION. Coloration. Immature specimens pale greenish yellow throughout. Mature specimens with dorsal surface of head and thorax reddish orange; genal cones yellow; abdomen yellowish brown to dark

brown; genitalia brown; forewing clear to pale yellowish, veins pale brown to dark brown, pigment spreading from the veins onto immediately adjacent areas of the membrane, apical pattern consisting of diffuse brown clouds of irregular form; antennal segments 1–6 brownish yellow; segments 7–10 brown; legs brownish yellow.

Structure. Head (Fig. 58) relatively broad, with genal cones convergent in front of frons. Forewing (Fig. 57) short and broad, oval; without pterostigma or costal break; spinules confined to radular areas; cells  $m_1$  and  $cu_{1a}$  of normal shape; vein  $Cu_{1a}$  weakly curved. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 78) simple; paramere (Fig. 79) relatively broad and appearing swollen along anterior margin, with large apical anteriorly directed tooth; aedeagus (Fig. 80) with apex strongly recurved. Female terminalia as in Fig. 102.

Measurements. See Table 2.

#### MATERIAL EXAMINED

Lectotype ♂, **France**: 'Gallia, Marseilles, type v. *Aryt. torifrons* Flor.' (NM). Paralectotype ♀, same data as lectotype. 78 ♂, ♀, **France** and **Spain** (BMNH, PL, IDH).

HOST PLANT. *Genista hispanica* L.

PUBLISHED DISTRIBUTION. France (Flor, 1861; Aulmann, 1913; Hodkinson & White, 1979a).

COMMENTS. This species is closest to *A. putonii* but differs in the shape and coloration of the forewing, the shape of the genal cones and the form of the male paramere and aedeagus.

### LIVILLA Curtis

*Livilla* Curtis, 1836: 625; Löw, 1863: 106; Puton, 1876: 288; Kieffer, 1905: 163; Oshanin, 1907: 366; 1912: 128; Pflugfelder, 1941: 75; Heslop-Harrison, 1951: 421; Loginova, 1976a: 599. Type-species: *Livilla ulicis* Curtis, 1836, by monotypy.

*Floria* Löw, 1879: 590; Kieffer, 1905: 164; Heslop-Harrison, 1951: 421; Oshanin, 1907: 367; 1912: 128; Pflugfelder, 1941: 77; Heslop-Harrison, 1951: 421; Loginova, 1976a: 598; Hodkinson & White, 1979a: 55. Type-species: *Psylla pyrenaea* Mink, 1859, designated by Oshanin, 1912: 128 (not by Haupt, 1935: 241 as indicated by Hodkinson & White, 1979a: 55). **Syn. n.**

*Alloeoneura* Löw, 1879: 594; Oshanin, 1907: 368; 1912: 128; Pflugfelder, 1941: 77; Heslop-Harrison, 1951: 421; Loginova, 1976a: 599. Type-species: *Arytaina radiata* Förster, 1848, by monotypy. **Syn. n.**

*Allaoneura* Löw; Puton, 1886: 93; Kieffer, 1905: 163. [Mis-spelling.]

*Floria* (*Floriella*) Ramirez Gomez, 1956: 87. Type-species: *Psylla pyrenaea* Mink, 1859, by monotypy. [Objective synonym of *Floria*.] **Syn. n.**

DIAGNOSIS. Head weakly deflexed, in same plane as thorax, eyes hemispherical, antennae usually slender, at least twice as long as head width; genal cones usually elongate and slender, little deflexed from the plane of the vertex. Pronotum broad and flat; propleurites quadrate, divided by a vertical suture. Forewing oval to oblong-oval, usually membranous but short and coriaceous in a few species. Costal break present or absent; pterostigma, if present, short; cell  $cu_{1a}$  not tall and usually not strongly arched. Basal metatarsus usually with 1 black spur, occasionally with 2 or 0. Male proctiger simple, without posterior process; paramere long and slender, tapered to a hooked apex; aedeagus with apex generally rounded, not strongly hooked as in *Arytaina*. Head and thorax often covered in abundant long setae. Associated with legumes of the tribe Genisteae.

COMMENTS. As defined above the genus *Livilla* probably constitutes a monophyletic group of 31 species living on legume hosts of the Genisteae, primarily within the Mediterranean Basin. The single South African species *annosa*, which Heslop-Harrison (1961b) designated type-species of the subgenus *Brinckitia*, is excluded from the study. The synonymy given above relates only to references not quoted under the individual species synonyms and to papers which deal specifically with generic synonymy. The genus now contains species previously included under the old generic names *Livilla*, *Floria* and *Alloeoneura* plus one species from *Amblyrhina*. We could find no characters that warrant the recognition of *Floria* and *Alloeoneura*. The general body form and genitalia of all the species is very similar and they differ from one another primarily in the form of the forewing. We regard the development of short, coriaceous forewings in some species merely as a specific adaptation for ensheathing the body to conserve water in a dry environment rather than as a generic synapomorphy. Based on characteristics of the forewing, six loosely defined groups of species can be recognised: the *ulicis*-, *horvathi*-, *burckhardti*-, *radiata*- and *spartiisuga*-groups, with a residual assemblage of heterogeneous species.



## Key to species

- 1 Forewing (Figs 103, 105, 107) coriaceous and strongly convex, oval, little more than twice as long as broad (*ulicis*-group) ..... 2
- Forewing (Figs 109, 115, 125, 139, 153) membranous, not strongly convex; usually longer and more oblong-oval in shape; if short and/or oval (*L. burckhardti* (Fig. 165) and *L. radiata* (Fig. 125)) then with apical brown patterning ..... 4
- 2 Genal cones (Fig. 104) massive, longer than the vertex. Forewing (Fig. 103) dark brown throughout; cell  $m_{1+2}$  elongate, longer than the stem of vein  $M_1$ ; wing membrane with short distinct furrows arising from and at right angles to the veins. General body colour shining dark brown to black throughout ..... *ulicis* Curtis (p. 23)
- Genal cones (Fig. 106, 108) shorter. Forewings (Figs 105, 107) yellowish to amber or brown, with a whitish basal patch; cell  $m_{1+2}$  shorter than stem of vein  $M$ ; membrane without distinct furrows. Body either reddish brown with paler markings or dark brown with 2 large white streaks which extend onto the base of the wings ..... 3
- 3 Forewing (Fig. 105) brown with broad white basal patch, costal margin weakly curved in basal third, cell  $cu_{1a}$  upright, surface spinules absent from most cells. Genal cones (Fig. 106) with very broadly rounded apices. Male genitalia as in Figs 170–172. Iberian Peninsula  
*bivittata* sp. n. (p. 24)
- Forewing (Fig. 107) yellow to amber throughout, without white basal patch, costal margin strongly curved in basal third, cell  $c+sc$  appearing to bulge outwards, cell  $cu_{1a}$  leaning towards base of wing, surface spinules obvious in all cells. Genal cones (Fig. 108) acutely tapered. Male genitalia as in Figs 173–175. Austria, Switzerland, N. Italy ..... *vicina* (Löw) (p. 24)
- 4 Forewing (Fig. 109) broadest in basal third, acutely tapering towards apex. Genal cones (Fig. 110) very short, extending little beyond the vertex (*burckhardti*-group) .... *cognata* (Löw) (p. 25)
- Forewing (Figs 115, 125, 149, 165) broadest at or beyond the middle, not acutely tapering towards apex. Genal cones (Figs 116, 126, 150, 166) much longer ..... 5
- 5 Forewing (Fig. 165) with subapical brown chevron pattern, wing apex narrowly rounded. Female terminalia (Fig. 270) long and slender. Genal cones shorter than the length of the vertex (*burckhardti*-group) ..... *burckhardti* sp. n. (p. 25)
- Forewing pattern, if present (Figs 121, 144, 157), not consisting of brown chevrons, wing apex more broadly rounded. Female terminalia (Figs 287–292) more robust. Genal cones (Figs 116, 122, 126, 132) usually at least as long as vertex ..... 6
- 6 Forewing (Fig. 153) clear, without colour pattern or suffused apex  
*genistae* Ramirez Gomez (p. 38)
- Forewing (Figs 131, 144, 161) either with a colour pattern or infusate apically ..... 7
- 7 Forewing (Fig. 125) short and broad, at most 2·1 times as long as broad, with colour pattern as shown in Fig. 125; cell  $r_1$  short and broad. Genal cones (Fig. 126) very long and slender (*radiata*-group) ..... *radiata* (Förster) (p. 29)
- Forewing (Figs 117, 121, 123, 127, 161) longer and narrower, more than 2·1 times as long as broad (except some male *L. poggii* (Fig. 142)); pattern not as in Fig. 125; cell  $r_1$  longer and narrower. Genal cones (Figs 118, 122, 124) usually shorter, if long (*L. spectabilis* (Fig. 162)) then more robust ..... 8
- 8 Forewing pattern (Figs 111, 113, 115, 117, 155) consisting of longitudinal brown streaks  
(*horvathi*-group) ..... 9
- Forewing pattern consisting of brown clouds (Fig. 119), small roundish maculations (Fig. 131), infuscation of the wing apex and/or the area adjacent to the anal margin (Figs 159, 163) or a combination of these characters (Figs 138, 139) ..... 13
- 9 Forewing pattern (Fig. 111) consisting of narrow longitudinal streaks immediately adjacent to the veins in the apical half of the wing. Female circumanal pore ring (Fig. 287) small, at most 0·19 times length of proctiger ..... *nervosa* sp. n. (p. 27)
- Forewing pattern (Figs 113–115, 117, 155) consisting of an anterior streak which may or may not be confined to the apex of vein  $R_s$ , and a posterior streak extending along the anal margin. Female circumanal pore ring (Figs 284, 288, 289, 290) at least 0·21 times length of proctiger ..... 10
- 10 Forewing (Figs 113, 115) with anterior streak confined to the apex of vein  $R_s$ , not extending into the basal half of the wing ..... 11
- Forewing (Figs 117, 155) with anterior streak extending across vein  $R_s$  into the basal half of wing ..... 12
- 11 Forewing (Fig. 113) with anterior streak consisting of a small spot around the apex of vein  $R_s$ ;



- costal margin of the wing weakly curved so that apex of cell  $r_1$  is abruptly truncated by vein  $R_s$ . Genal cones (Fig. 114) strongly divergent, outer margins strongly concave, apex broadly rounded. Male proctiger (Fig. 182) somewhat lobed posteriorly. Male aedeagus as in Fig. 184. N. Africa ..... *nigralineata* sp. n. (p. 27)
- Forewing (Fig. 115) with a larger spot or streak around vein  $R_s$ ; costal margin more strongly curved so that apex of cell  $r_1$  is more narrowly truncated by vein  $R_s$ . Genal cones (Fig. 116) less divergent, outer margins at most weakly concave, apex narrowly rounded. Male proctiger (Fig. 185) less obviously lobed. Male aedeagus as in Fig. 187. E. Europe  
*horvathi* (Scott) (p. 26)
- 12 Forewing (Fig. 117) elongate oblong-oval; anterior streak adjoining the costal margin and extending basally to just beyond bifurcation of vein  $R$ . Genal cones (Fig. 118) longer and slenderer. Male aedeagus (Fig. 190) with a hooked apex. C. Europe  
*vittipennella* (Reuter) (p. 28)
- Forewing (Fig. 155) more broadly oval; anterior streak not adjoining the costal margin, leaving a long clear area, but extending to base of wing. Genal cones (Fig. 156) shorter and more robust. Male aedeagus (Fig. 232) with a bulbous apex. Afghanistan ..... *klapperichi* sp. n. (p. 28)
- 13 Forewing (Figs 119, 121, 123) with the two apical branches of the  $M$  vein strongly divergent, vein  $M_{1+2}$  meeting the marginal vein well above the wing apex (*radiata*-group) ..... 14
- Forewing (Figs 131, 132, 135, 157) with the branches of vein  $M$  not strongly divergent, vein  $M_{1+2}$  meeting the marginal vein at or below the wing apex ..... 16
- 14 Forewing pattern (Fig. 123) consisting of small round brown maculae which become confluent and form an irregular brown pattern in the apical and posteroapical regions of the wing; costal margin strongly curved throughout. Dorsum of thorax uniformly shining chocolate brown. Genal cones (Fig. 124) conical. On *Genista fasselata* ..... *syriaca* (Löw) (p. 31)
- Forewing (Figs 119, 121) without small brown maculae, pattern consisting primarily of brown clouds or bold markings in the apical third of the wing, occasionally with slight infuscation in the basal half; costal margin almost straight between the points where veins  $R_1$  and  $R_s$  meet the marginal vein. Dorsum of thorax not uniformly shining chocolate brown. Genal cones (Figs 120, 122) more elongate. On other hosts ..... 15
- 15 Veins in apical third of forewing (Fig. 121) dark brown to black, pattern very dark brown; occasionally with the basal half of the wing weakly infuscate. Genal cones (Fig. 122) divergent. Basal metatarsus with one thick black spur. Male paramere (Fig. 195) with a strongly serrated anterior margin and a massive apical tooth. Male aedeagus (Fig. 196) with thin shaft and relatively large apex. Host plant unknown ..... *lautereri* sp. n. (p. 30)
- Veins in the apical third of forewing (Fig. 119) not dark brown to black, pattern more widespread but less intense, mid brown; basal part of wing not infuscate. Genal cones (Fig. 120) not divergent. Basal metatarsus without thick black spurs. Male paramere (Fig. 192) without strongly serrated anterior margin and with a small apical tooth. Male aedeagus (Fig. 193) with a broader shaft and a relatively small apex. On *Retama* sp. .... *retamae* (Puton) (p. 30)
- 16 Forewing (Fig. 161) long and narrow, of a characteristic shape, pattern consisting of an irregular brown or orange-brown infuscation of the membrane, primarily in the apical third and a darker brown spot around vein  $Cu_{1b}$ . Genal cones (Fig. 162) very long, at least 2.85 times length of vertex. Antennae very long, at least 2.85 times head width. On *Spartium junceum* ..... *spectabilis* (Flor) (p. 37)
- Forewing (Figs 131, 151, 157, 161) relatively shorter and broader, pattern not as above. Genal cones (Figs 132, 152, 158, 164) less than 1.3 times length of vertex. Antennae relatively shorter, less than 2.85 times head width. On other hosts ..... 17
- 17 Forewing (Fig. 157) with distinct chocolate brown colour pattern distributed around the apex of vein  $R_s$ , the apical half and branches of vein  $M$  and around veins  $Cu_{1a}$  and  $Cu_{1b}$  (*spartiisuga*-group) ..... *pseudoretamae* sp. n. (p. 35)
- Forewing (Figs 131, 144, 145, 159) without distinct chocolate brown patterning in apical third; if similarly shaped pattern to *pseudoretamae* present then much paler, more diffuse and overlaid with small round maculations ..... 18
- 18 Forewing (Fig. 159) slightly rugose, small maculae absent, yellow-brown to orange-brown infuscation occupying a continuous band extending around the apex and along the posterior wing margin; remainder of membrane lighter; pigment darker along vein margins giving a somewhat furrowed appearance. Male proctiger (Fig. 239) with a slight basal posterior lobe  
*adusta* (Löw) (p. 39)
- Forewing (Figs 131, 139) usually with small maculae present and broadly distributed through-

- out the wing, often overlying the areas of infuscation when present. If maculae apparently absent (in some specimens of *L. variegata* and *L. maura* they are nebulous and indistinct) then infuscation distributed as in Fig. 169, or forewing membrane uniformly yellow to orange (Fig. 151). Male proctiger (Figs 203, 206, 209, 245) without basal posterior lobe ..... 19
- 19 Forewing (Figs 127, 131, 135, 137, 142) with small brown maculae distributed throughout (*spartiisuga*-group) ..... 20
- Forewing (Figs 151, 163) with maculae absent or very indistinct; when present very nebulous and confined to the apical half of wing ..... 30
- 20 Sexually dimorphic species. Male forewing (Fig. 142) with a pale maculation-free band running transversely across the centre. Female forewing (Fig. 141) maculate throughout; vein *M* very strongly arched in both sexes, cell *cu*<sub>1</sub> very short and high. Apex of male aedeagus as in Fig. 226. On *Genista corsica* in Sardinia ..... *poggii* (Conci & Tamanini) (p. 36)
- Forewing (Figs 129, 131, 133, 137) without transverse pale band, occasionally with a pale longitudinal band; vein *M* less strongly arched and cell *cu*<sub>1a</sub> flatter and more elongate. Apex of male aedeagus (Figs 217, 220, 223) of different shape. On other host plants ..... 21
- 21 Ground coloration of forewing membrane (Figs 127, 129, 131, 133), excluding maculae, uniform, clear to pale yellow throughout ..... 22
- Ground coloration of forewing membrane (Figs 135, 144, 145, 147, 149), excluding maculae, two-tone, clear to pale yellow along anterior half of wing, pale brown to orange-brown along posterior half and/or around the apex ..... 27
- 22 Maculae absent from a broad band running along anterior margin of forewing (Fig. 133); wing with a somewhat truncate apex. Male and female genitalia as in Figs 212–214, 274. On *Calicotome spinosa* and *Genista pilosa* ..... *pyrenaea* (Mink) (p. 34)
- Maculae present in area along anterior margin of forewing (Figs 129, 131, 137); wing shaped differently, with a less truncate apex. Male and female genitalia as in Figs 206–208, 209–211, 221–223, 271–272. On other hosts ..... 23
- 23 Maculae absent from a longitudinal band running the length of cell *r*<sub>s</sub> (Fig. 137). Male paramere (Fig. 219) long and curved posteriorly in apical half. Apex of aedeagus (Fig. 220) smoothly rounded ..... *spartiisuga* (Puton) (p. 31)
- Maculae present throughout cell *r*<sub>s</sub> (Figs 127, 129, 131, 139). Male paramere (Figs 204, 207, 222) usually shorter and broader, if long (Fig. 210) then straighter. Apex of aedeagus (Figs 205, 208, 211, 223) more angular ..... 24
- 24 Forewing (Figs 129, 131) long and parallel-sided, costal margin beyond the pterostigma weakly curved to straight; cell *cu*<sub>1a</sub> elongate ..... 25
- Forewing (Figs 127, 139) broader and more oval, costal margin beyond the pterostigma strongly curved, cell *cu*<sub>1a</sub> shorter and more upright ..... 26
- 25 Vein *R*<sub>s</sub> of forewing (Fig. 129) strongly curved upwards to meet the costal margin, cell *r*<sub>1</sub> broad; veins *M* and *Cu* with a longish common stem. Male paramere (Fig. 207) broad basally, gradually narrowing and curving posteriorly towards the apex; basal posterior margin with conspicuous thick setae. Male aedeagus (Fig. 208) short and robust. Genal cones (Fig. 130) long and slender. Smaller species; head width less than 0.7 mm. Iberian Peninsula and N. Africa ..... *maculipennis* sp. n. (p. 33)
- Vein *R*<sub>s</sub> of forewing (Fig. 131) more sinuous, less strongly curved towards costal margin, cell *r*<sub>1</sub> narrower; veins *M* and *Cu* with a short common stem. Male paramere (Fig. 210) long and thin, posterior margin with normal setae. Male aedeagus (Fig. 211) longer and more slender. Genal cones (Fig. 132) shorter and more robust. Larger species; head width greater than 0.7 mm. Sicily ..... *siciliensis* sp. n. (p. 32)
- 26 Forewing (Fig. 127) with a broadly rounded apex; vein *R*<sub>s</sub> weakly sinuate, vein *Cu*<sub>1a</sub> weakly curved in apical half. Male paramere (Fig. 204) broad and parallel-sided. Weakly tapered towards the apex. Apex of male aedeagus as in Fig. 205. Spain and S. France  
*cataloniensis* (Hodkinson & White) (p. 32)
- Forewing (Fig. 139) with a narrowly rounded apex; vein *R*<sub>s</sub> strongly sinuate, vein *Cu*<sub>1a</sub> strongly curved in apical half. Male paramere (Fig. 222) narrower and more tapered towards the apex. Apex of male aedeagus as in Fig. 223. Greece and Crete *hodkinsoni* (Burckhardt) (p. 33)
- 27 Forewing (Fig. 199) with maculae around apex of vein *R*<sub>s</sub> dark brown to black, distinct, much darker than those elsewhere on the wing; brown ground colour not extending right round the wing apex; wing oval, broadest in the middle, with a narrowly rounded apex. Male paramere and aedeagus as in Figs 254–256. Corsica and Sardinia ..... *bimaculata* sp. n. (p. 34)
- Forewing (Figs 135, 144, 145, 147) with maculae around apex of vein *R*<sub>s</sub> similar in colour to



- those elsewhere on the wing; brown ground colour extending further around the wing apex; wing oblong oval, broadest in apical third, with a broadly rounded apex. Male paramere and aedeagus as in Figs 215–217, 236–238, 251–252 ..... 28
- 28 Larger species, head width greater than 0.70 mm, wing length greater than 2.1 mm. Male paramere (Fig. 216) long and narrow, with a kink at mid length and without very thick basal posterior setae. Male aedeagus (Fig. 217) very long and narrow. Genal cones (Fig. 136) somewhat divergent. Forewing (Fig. 135) usually without clear pale areas at the apices of cells  $r_s$ ,  $m_{1+2}$  and  $m$ . Sicily on *Genista aetnensis* ..... *magna* sp. n. (p. 36)
- Smaller species, head width less than 0.70 mm, wing length less than 2.10 mm. Male paramere (Figs 237, 252) shorter and broader, without a kink at mid length but with conspicuous basal posterior setae. Male aedeagus (Figs 238, 253) shorter. Genal cones (Figs 146, 148) less divergent. Forewing (Figs 144, 145, 147) often with clear areas at the apices of cells  $r_s$ ,  $m_{1+2}$  and  $m$ . Not known from Sicily; on other hosts ..... 29
- 29 Forewing (Figs 144, 145) relatively narrow, cell  $r_1$  elongate, cell  $cu_{1a}$  moderately long, patterning as in Fig. 145 although in some specimens, including the type series, the extent of the markings is reduced (Fig. 144). Male paramere (Fig. 237) narrowly tapered to apex. Male aedeagus (Fig. 238) with apex weakly hooked. Genal cones (Fig. 146) long and slender. On *Genista hirsuta* ..... *blandula* (Horvath) (p. 35)
- Forewing (Fig. 147) broader, cell  $r_1$  shorter and broader, cell  $cu_{1a}$  shorter and more upright. Male paramere (Fig. 252) more broadly tapered to apex. Male aedeagus (Fig. 253) with apex strongly hooked. Genal cones (Fig. 148) slightly shorter and more robust. On *Genista triacanthos* ..... *lusitanica* sp. n. (p. 36)
- 30 Forewing (Fig. 163) long, broadest in apical third, veins very fine and indistinct, concolorous with membrane; membrane whitish, often with apex infusate; when infusate then pale areas absent from apices of cells  $r_s$ ,  $m_{1+2}$  and  $m$ . Genal cones (Fig. 164) slender, longer than vertex. Female circumanal pore ring (Fig. 269) less than 0.3 times proctiger length. Larger species, head width greater than 0.67 mm, wing length greater than 2.6 mm. Male genitalia as in Figs 245–247. Europe, on *Laburnum* spp. .... *variegata* (Löw) (p. 38)
- Forewing (Fig. 151) relatively shorter and broader, broadest in middle, veins more robust, darker than membrane, apex not infusate, membrane yellow to pale amber with small paler patches at the apex of cells  $r_s$ ,  $m$  and  $m_{1+2}$ . Genal cones (Fig. 152) more robust, shorter than the vertex. Female circumanal ring (Fig. 282) relatively longer, more than 0.3 times proctiger length. Smaller species, head width less than 0.66 mm, wing length less than 2.5 mm. Male unknown. N. Africa, host unknown ..... *maura* (Vondráček) (p. 39)

### The *ulicis*-group

The species in this group all possess short, oval, coriaceous forewings.

#### *Livilla ulicis* Curtis

(Figs 103, 104, 167–169, 263)

*Livilla ulicis* Curtis, 1836: 625; Förster, 1848: 68; Meyer-Dür, 1871: 404; Scott, 1876: 528; 1882a: 14; 1882b: 255; Reiber & Puton, 1880: 75; Löw, 1883: 252; Horvath, 1886: 314; 1918a: 58; Ferrari, 1888: 76; Edwards, 1896: 250; Dubois, 1898: 239; Puton, 1899: 113; Hueber, 1904: 276; Olivier, 1904: 96; Oshanin, 1907: 366; 1912: 128; Reuter, 1909: 63; Joakimov, 1909: 1; Lambertie, 1910: 96; Aulmann, 1913: 33; Prohaska, 1928: 5; Haupt, 1935: 231; Schaefer, 1949a: 19; 1949b: 30; Vondráček, 1951b: 128; 1957: 185; Tamanini, 1955: 11; Ramirez Gomez, 1956: 96; Wagner & Franz, 1961: 163; Dobreanu & Manolache, 1962: 146; Lauterer, 1965: 174; 1977: 98; Loginova, 1964: 462; 1976a: 599; Klimaszewski, 1964: 65; 1965: 203; 1967: 14; 1969a: 43; 1973: 195; 1975: 133; Hodkinson & White, 1979b: 39; White & Hodkinson, 1982: 26; Burckhardt, 1983: 55. Syntypes ♂, ♀, GREAT BRITAIN: England (UMM).

*Psylla coleoptera* Waltl, 1837: 277. Types (not stated), GERMANY. [Synonymised by Löw, 1883: 252.]

*Psylla callunae* Rudow, 1875: 7. Types (not stated), GERMANY. [Synonymised by Löw, 1883: 252.]

DESCRIPTION. Coloration. Mature specimens with dorsal surface of head and thorax shining, dark brown; sclerites of abdomen dark brown, intersegmental membranes reddish yellow; genitalia brown; forewing uniform shining brown, veins concolorous; antennal segments 1–3 yellow; segments 4–10 dark brown; legs yellowish brown.

Structure. Head (Fig. 104) with massive sub-cylindrical genal cones, much longer than vertex. Forewing (Fig. 103) oval short, coriaceous, strongly convex; costal break and pterostigma absent; spinules, if

present, confined to radular areas; vein  $R_s$  almost straight; cell  $m_{1+2}$  elongate; vein  $M_1$  reaching to wing apex; cell  $cu_{1a}$  small and flat; vein  $Cu_{1a}$  almost straight; short furrows running through membrane at right angles to the veins. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 167) simple; paramere (Fig. 168) with a few slightly thickened basal setae on the posterior margin; aedeagus (Fig. 169) with bulbous apex. Female terminalia as in Fig. 263.

Measurements. See Table 3.

#### MATERIAL EXAMINED

This is too extensive to list but includes all the material deposited in the BMNH.

HOST PLANTS. *Genista tinctoria* L. and possibly *Ulex europaeus* L. The record for *Ononis spinosa* L. by Ferrari (1888) is unlikely to be correct.

PUBLISHED DISTRIBUTION. Austria (Prohaska, 1928; Haupt, 1935); Bulgaria (Joakimov, 1909; Klimaszewski, 1965), Czechoslovakia (Vondráček, 1957; Lauterer, 1965, 1977; France (Reiber & Puton, 1880; Dubois, 1898; Olivier, 1904; Reuter, 1909; Lambertie, 1910), German D.R. (Förster, 1848), German F.R. (Haupt, 1935), Great Britain (Curtis, 1836; Scott, 1876; Edwards, 1896; Hodkinson & White, 1979b; White & Hodkinson, 1982), Hungary (Löw, 1888a; Horvath, 1886, 1918a), Italy (Ferrari, 1888; Vondráček, 1951b; Tamanini, 1955), Poland (Klimaszewski, 1964a, 1967, 1969a, 1975), Rumania (Dobreanu & Manolache, 1962), Switzerland (Schaefer, 1949a,b; Burckhardt, 1983), U.S.S.R.: European part (Loginova, 1964).

COMMENTS. *Livilla ulicis* is closest to *L. bivittata* from which it can be distinguished by the longer genal cones and the shape of cells  $cu_1$  and  $m_1$  of the forewing.

#### *Livilla bivittata* sp. n.

(Figs 105, 106, 170–172, 264)

DESCRIPTION. Coloration. Mature specimens with dorsal surface of head and thorax dark shiny brown with a pale median streak running medially along head and thorax from base of genal cones to apex of scutellum; further pale streaks running across humeral region and extending on to wing base; abdominal sclerites and underside of head and thorax paler yellowish brown; terminalia brown; forewing membrane brown with a pale longitudinal streak at the base, veins concolorous; antennal segments 1–2 yellow; segments 3–5 brownish yellow, apically infusate; segments 6–10 dark brown; legs brownish yellow.

Structure. Head (Fig. 106) with short cylindrical genal processes which are evenly rounded at the apex. Forewing (Fig. 105) coriaceous, strongly convex; lacking spinules; short, oval shaped; vein  $R_s$  straight; cell  $m_1$  and  $cu_{1a}$  small, vein  $M_{1+2}$  reaching to just below wing apex; pterostigma and costal break absent. Metatibia with 5 thick black apical spurs; metatarsus with 1 black spur. Male proctiger (Fig. 170) simple; paramere (Fig. 171) without stout basal posterior spines; aedeagus (Fig. 172) with slightly hooked apex. Female terminalia as in Fig. 264.

Measurements. See Table 3.

Holotype ♂, **Portugal**: Villa Formosana, 1954 (*Heslop-Harrison*) (BMNH).

Paratypes. 1 ♂, 1 ♀ same data as holotype, 3 ♂, 2 ♀ from unknown locality, but intermixed with specimens from Spain and Portugal (*Heslop-Harrison*) (BMNH). In addition there is a lot of material of this species without locality labels and in poor condition in the Heslop-Harrison collection (BMNH) which is not included in the type series.

HOST PLANT. Unknown.

COMMENTS. This species is closest to *Livilla ulicis*, but can be distinguished from it by the shorter genal cones and the shape of cells  $m_1$  and  $cu_1$  of the forewing.

#### *Livilla vicina* (Löw) comb. n.

(Figs 107, 108, 173–175, 265)

*Floria vicina* Löw, 1886: 159; 1888a: 20, Puton, 1886: 92; Hueber, 1904: 276; Oshanin, 1907: 367; 1912: 128; Aulmann, 1913: 35; Prohaska, 1928: 5; Haupt, 1935: 242; Klimaszewski, 1973: 195; Loginova, 1976a: 599; Burckhardt, 1983: 55. Syntypes ♂, ♀, AUSTRIA [missing from Löw collection, NM].

*Arytaena montana* Cerutti, 1939a: 448; 1939b: 583; Schaefer, 1949a: 55; 1949b: 31. Lectotype ♂, SWITZERLAND, designated by Burckhardt, 1983 (MZL). [Synonymised by Burckhardt, 1983: 55.]

*Arytaina montana* (Cerutti) Heslop-Harrison, 1951: 435; Tamanini, 1955: 11; 1977: 109; Klimaszewski, 1973: 191, Loginova, 1976a: 598.



**DESCRIPTION.** Coloration. Genal cones, vertex and thoracic dorsum dirty orange-yellow, with indistinct darker orange markings on thorax; abdominal sclerites brown, intersegmental membranes yellowish orange; genitalia dirty yellow to brown; forewing coriaceous, membrane yellow to orange, veins concolorous; antenna orange-yellow basally becoming darker towards apex; legs orange-yellow.

**Structure.** Head (Fig. 108) with genal cones slightly shorter than vertex, proximate, with rounded apices. Forewing (Fig. 107) short and broad, oblong-oval; cell  $c+sc$  bulging outwards; costal break and pterostigma absent; spinules present throughout all cells; vein  $Rs$  sinuous, not strongly curved at apex; cell  $m_{1+2}$  narrow; vein  $M_{1+2}$  reaching margin below wing apex; cell  $cu_{1a}$  large and leaning towards base of wing; vein  $cu_{1a}$  weakly curved. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 173) simple; paramere (Fig. 174) slender, without thickened setae on basal posterior margin; aedeagus (Fig. 175) with strongly recurved apex. Female terminalia as in Fig. 265.

Measurements. See Table 3.

#### MATERIAL EXAMINED

9 ♂, 11 ♀, **Switzerland** and **Italy** (BMNH, DB, IDH, MM).

**HOST PLANT.** *Genista radiata* (L.) Scop.

**PUBLISHED DISTRIBUTION.** Austria (Löw, 1886, 1888a; Prohaska, 1928; Haupt, 1935), Italy (Tamanini, 1955, 1977), Switzerland (Cerutti, 1939a,b; Schaefer, 1949a,b; Burckhardt, 1983).

**COMMENTS.** It is a measure of the confusion that has existed within the Arytainini that this species has belonged simultaneously to two separate genera. *L. vicina* resembles *L. ulicis* and *L. bivittata* in possessing short oval coriaceous forewings, but it can be distinguished from both these species by the shape and detailed venation of the forewing and by the shape of the head and genal cones.

### The *burckhardti*-group

The two members of this group have the forewing apex narrowly rounded, and very short genal cones.

#### *Livilla burckhardti* sp. n.

(Figs 165, 166, 248–250, 270)

**DESCRIPTION.** Coloration. Specimens in the type series appear to have been taken while developing their full adult coloration. General body colour (preserved in alcohol) dirty yellow, possibly green in life; sclerites of abdomen beginning to turn brown; forewing clear, with brown colour pattern; veins yellow; antennae and legs concolorous with body.

**Structure.** Head (Fig. 166) with short, broad genal cones. Forewing (Fig. 165) short and oval; pterostigma and costal break absent; spinules present throughout all cells; vein  $Rs$  strongly curved towards marginal vein; vein  $M$  evenly curved; vein  $M_{1+2}$  reaching to just below wing apex; vein  $cu_{1a}$  strongly curved. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 248) simple; paramere (Fig. 249) relatively short and broad; aedeagus as in Fig. 250. Female terminalia (Fig. 270) long and slender with dorsal margin of proctiger shallowly convex.

Measurements. See Table 3.

Holotype ♂, **Spain**: Pyrenees, Ordesa National Park, 160 m, on spiny *Genista* (*Lienhard*) (ETH).

Paratypes. 1 ♂, 2 ♀, same data as holotype.

**HOST PLANT.** The type series was collected from a spiny *Genista* species.

**COMMENTS.** *L. burckhardti* appears to be closest to *L. cognata* but the resemblance may be superficial. It can be separated from all other members of the genus by the chevron patterning in the forewing.

#### *Livilla cognata* (Löw) comb. n.

(Figs 109, 110, 176–178, 266)

*Amblyrhina cognata* Löw, 1882b: 258; Oshanin, 1907: 365; 1912: 128; Puton, 1886: 92; Haupt, 1935: 241; Vondráček, 1951b: 128; 1957: 178; Wagner & Franz, 1961: 162; Lauterer, 1965: 174; 1977: 98; Loginova, 1976a: 598; Klimaszewski, 1970: 420; 1973: 189; Gegechkori, 1984: 147; Tamanini, 1977: 107; Glowacka & Harisanov, 1983: 64. **LECTOTYPE** ♂, **AUSTRIA**, here designated (NM) [examined].

*Ambly[r]rhina cognata* Löw; Löw 1888a: 19. [Mis-spelling.]

**DESCRIPTION.** Coloration. General colour of head, thorax and abdomen bright green, often with orange

markings on dorsum of thorax; forewing membrane clear, occasionally with faint brown clouds in apical half of wing; veins pale, weakly pigmented; antennae green, apical segments infuscate, legs green. Specimens to hand are probably immature and it is likely this species darkens as it becomes older.

Structure. Head (Fig. 110) short and broad, with small broadly rounded genal cones. Forewing (Fig. 109) oval, with a narrowly rounded apex; costal break and pterostigma absent; spinules confined to apices of cells; vein  $R_s$  not strongly curved to wing margin; vein  $M_1$  evenly curved; vein  $M_{1+2}$  reaching to just below wing apex; cell  $cu_{1a}$  flat; vein  $Cu_{1a}$  weakly curved. Metatibia with 5 thick black spurs at apex; basal metatarsus with 1 black spur. Male proctiger (Fig. 176) simple; paramere (Fig. 177) slender, without thickened basal posterior spines; aedeagus (Fig. 178) with a weakly angled apex. Female terminalia as in Fig. 266.

Measurements. See Table 3.

#### MATERIAL EXAMINED

Lectotype ♂, Austria: 'Austria inf., Modling, det Löw' (NM).

Paralectotype ♀, same data as lectotype. 2 ♂, 2 ♀ Austria (BMNH).

HOST PLANTS. *Chaemaecytisus ratisbonensis* (Schaeffer) Rothm., *Chamaecytisus supinus* (L.) Link, *Genista germanica* L.

PUBLISHED DISTRIBUTION. Austria (Löw, 1882b, 1888a; Vondráček, 1951b; Wagner & Franz, 1961), Bulgaria (Klimaszewski, 1970; Glowacka & Harisanov, 1983), Czechoslovakia (Lauterer, 1965, 1977; Vondráček, 1957), France (Aulmann, 1913), 'Germania' (Haupt, 1935), Italy (Tamanini, 1977), U.S.S.R.: Caucasus (Gegechkori, 1983).

COMMENTS. This species has been separated from those with which it had previously been placed within the genus *Amblyrhina*. The characters of the genitalia suggest that it belongs in *Livilla*, even though the genal cones are much shorter than is usual for the genus. It is distinguished further from other *Livilla* species by the narrowly rounded apex of the forewing.

### The *horvathi*-group

Members of this group are recognised by the longitudinal brown banding patterns on the forewing membrane.

#### *Livilla horvathi* (Scott) comb. n.

(Figs 115, 116, 185–187, 289)

*Floria horvathi* Scott, 1879: 84; Löw, 1883: 240; 1888a: 20; Horvath, 1886: 314; 1918a: 58; Puton, 1886: 93; Oshanin, 1907: 368; 1912: 128; Aulmann, 1913: 34; Klimaszewski, 1964: 64; 1967: 14; 1968b: 781; 1969a: 46; 1973: 193; 1975: 130; Loginova, 1964: 464; 1976a: 599; Vondráček, 1957: 192; Lauterer, 1977: 98; Klimaszewski & Lodos, 1979: 7; Glowacka & Harisanov, 1983: 64; Onucar, 1983: 56. Holotype ♀, HUNGARY [not traced].

[*Floria vittipennella* Reuter sensu Vondráček, 1951b: 128; Smrezyński, 1954: 141. Misidentifications.]

DESCRIPTION. Coloration. Body colour of immature specimens green throughout. Mature specimens with vertex and thoracic dorsum dirty greenish yellow with brown markings; genal cones dirty yellow to pale brown; abdominal sclerites dark brown, intersegmental membranes greenish yellow; genitalia yellow-brown to brown; forewing membrane clear, veins dirty yellow to pale brown; colour pattern orange-brown; antennal segments 1–4 dirty yellow, 2–4 apically darkened, remainder brown; legs brownish yellow, femora occasionally brown above.

Structure. Head (Fig. 116) with long divergent genal cones with narrowly rounded apices. Forewing (Fig. 115) elongate oval, without pterostigma or costal break; fine spinules distributed throughout all cells; vein  $R_s$  moderately strongly curved towards margin; vein  $M$  slightly sinuous; vein  $M_{1+2}$  reaching to wing apex; cell  $cu_{1a}$  moderately long but not high; vein  $Cu_{1a}$  evenly arched. Metatibia with 5 thick black spurs at apex; basal metatarsus with 1 black spur. Male proctiger (Fig. 185) simple; paramere (Fig. 186) without stout setae on basal posterior margin; aedeagus (Fig. 187) with curved bulbous apex. Female terminalia as in Fig. 289.

Measurements. See Table 3.

#### MATERIAL EXAMINED

1 ♂, 1 ♀, 'Scott collection' [no further data] (BMNH). 16 ♂, 16 ♀, Greece, Bulgaria and Czechoslovakia (DB, MM, IDH).

HOST PLANT. *Chamaecytisus austriacus* (L.) Link.



PUBLISHED DISTRIBUTION. Bulgaria (Klimaszewski, 1967; Glowacka & Harisanov, 1983), Czechoslovakia (Vondráček, 1957; Lauterer, 1977), Greece (Vondráček, 1951*b*), Hungary (Löw, 1888*a*; Horvath, 1886, 1918*a*), Poland (Klimaszewski, 1964, 1967, 1968*b*, 1969*a*, 1975; Smrezynski, 1954), Rumania (Dobreanu & Manolache, 1962), Turkey (Klimaszewski & Lodos, 1979; Onucar, 1983), European U.S.S.R. (Loginoва, 1964).

COMMENTS. This appears to be the sister species of *L. nigrilineata*. The two species differ from each other in the distribution of brown markings on the forewing and in the shape of the genal cones and male genitalia, particularly the aedeagus.

***Livilla nigrilineata* sp. n.**

(Figs 113, 114, 182–184, 288)

DESCRIPTION. Coloration. The type series comprises specimens which probably have not developed their full adult coloration. General colour pale green throughout with orange markings on the dorsum of the head, thorax and abdomen. Forewing membrane clear, wing pattern reddish brown. Antennae with segments 6–10 dark brown.

Structure. Head (Fig. 114) with genal cones widely divergent, longer than vertex, with evenly rounded apices. Forewing (Fig. 113) elongate oval, almost parallel-sided; costal break and pterostigma absent; spinules fine, present in all cells but restricted in the cells along the anterior edge of wing; cell  $cu_{1a}$  moderately long; vein  $Cu_{1a}$  moderately strongly arched. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 thick black spur. Male proctiger (Fig. 182) simple; paramere (Fig. 183) relatively stout, parallel-sided; aedeagus (Fig. 184) with slightly hooked apex. Female terminalia as in Fig. 288.

Measurements. See Table 3.

Holotype ♂, **Algeria**: Mtns de Belezma, 1500 m, 5.viii.1980 (*Remane*) (BMNH).

Paratypes. 1 ♂, 2 ♀, same data as holotype.

HOST PLANT. Unknown.

COMMENTS. This appears to be the sister species to *horvathi*. It is separated from the latter by the smaller patch of brown markings around the apex of vein *Rs* and by the more divergent genal cones.

***Livilla nervosa* sp. n.**

(Figs 111, 112, 179–181, 287)

DESCRIPTION. Coloration. Mature specimens with head, thorax and abdomen pale dirty yellow; dorsum of thorax and vertex with pale orange or pale brown markings; abdomen yellowish or green, turning brownish in older specimens; genitalia yellow to brownish yellow; forewing membrane clear to pale yellow, veins yellow; patterning pale brown; antennal segments 1–2 yellow, segments 3 to 5 darkened apically, segments 6 to 10 dark brown; legs yellow.

Structure. Head (Fig. 112) with slender divergent genal cones, slightly longer than vertex. Forewing (Fig. 111) elongate oblong-oval, almost parallel-sided; costal break and pterostigma absent; fine spinules present throughout all cells. Vein *Rs* strongly curved towards wing margin; vein *M* long and evenly curved; vein  $M_{1+2}$  meeting margin well above wing apex; cell  $cu_{1a}$  moderately long. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 179) simple; paramere (Fig. 180) curved posteriorly, with thickened setae present on basal posterior margin; aedeagus (Fig. 181) with angular bulbous apex. Female terminalia (Fig. 287) with very short circumanal pore ring.

Measurements. See Table 3.

Holotype ♂, **Spain**: Cordoba, Embalse de Iznajar, nr Iznajar, 12.vi.1977, (*Hollis*) (BMNH).

Paratypes. **Spain**: 8 ♂, 15 ♀, same data as holotype; 1 ♀, 1 nymph, Andalusia, Porto de los Alazores, 800 m, 30.viii.1975 (*Lienhard*) (DB).

HOST PLANT. *Genista radiata* (L.) Scop.

COMMENTS. The upturned vein  $M_{1+2}$  of the forewing also resembles that found in members of the *radiata*-group; otherwise *L. nervosa* resembles members of the *horvathi*-group. It is distinguished by the characteristic forewing pattern.

*Livilla vittipennella* (Reuter) comb. rev.

(Figs 117, 118, 188–190, 290)

*Psylla vittipennella* Reuter, 1875: 333. Syntypes ♂, ♀ YUGOSLAVIA [not located].*Floria vittipennella* (Reuter) Löw, 1879: 593; 1888a: 20; Puton, 1886: 93; Hueber, 1904: 276; Oshanin, 1907: 367; 1912: 128; Prohaska, 1928: 5; Haupt, 1935: 242; Burckhardt, 1983: 54.*Livilla vittipennella* (Reuter) Aulmann, 1913: 34.*Floria lineata* Cerutti, 1939a: 445; 1939b: 583; Schaefer, 1949a: 55; 1949b: 31; Klimaszewski, 1973: 193; Loginova, 1976a: 599; Tamanini, 1977: 111. Lectotype ♂, SWITZERLAND (MZL) designated by Burckhardt, 1983. [synonymised by Burckhardt, 1983: 54.]*Floria vittipennella* (Reuter); Klimaszewski, 1973: 195; Loginova, 1976a: 599.

DESCRIPTION. Coloration. Mature specimens with dorsum of thorax and vertex brownish yellow with orange markings; genal cones yellow; remainder of body orange-yellow; forewing membrane clear, veins yellow; colour pattern reddish brown; antennal segments 1 and 2 yellow-orange, remainder pale brownish becoming darker towards antennal apex; legs orange-yellow. In some less mature specimens the body coloration often has a greenish tinge.

Structure. Head (Fig. 118) with genal cones long and slender and with narrowly rounded apices. Forewing (Fig. 117) oblong-oval with a somewhat truncate apex; costal break and rudimentary pterostigma usually absent; fine spinules present throughout all cells; vein *Rs* strongly curved towards the margin; vein *M* evenly curved; vein  $M_{1+2}$  reaching to wing apex; cell  $cu_{1a}$  shortish but tall; vein  $Cu_{1a}$  strongly arched. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 188) simple; paramere (Fig. 189) with inner tooth somewhat set back from apex and without thickened setae on basal posterior margin; aedeagus (Fig. 190) with strongly recurved apex. Female terminalia as in Fig. 290.

Measurements. See Table 3.

## MATERIAL EXAMINED

10 ♂, 11 ♀, **Switzerland** and **Italy** (IDH, BMNH, DB).HOST PLANT. *Genista radiata* (L.) Scop.

PUBLISHED DISTRIBUTION Austria (Löw, 1888a; Prohaska, 1929; Haupt, 1935), Italy (Tamanini, 1977), Switzerland (Cerutti, 1939a, b; Schaefer, 1949a, b; Burckhardt, 1983), Yugoslavia (Reuter, 1875).

COMMENTS. *L. vittipennella* is distinguished from other members of the genus by the extensive brown band extending along the fore margin of the wing.*Livilla klapperichi* sp. n.

(Figs 155, 156, 230–232, 284)

DESCRIPTION. Coloration. Genal cones, vertex and dorsum of thorax brick red with white markings; underside of head and thorax orange-yellow; abdomen brownish yellow; genitalia yellow; forewing membrane clear with reddish brown pattern; veins yellow to brown; antennal segments 1–8 dirty yellow, segments 4–8 apically infusate; segments 9–10 dark brown; legs orange-yellow.

Structure. Head (Fig. 156) with genal cones somewhat divergent, about as long as vertex, with narrowly rounded apices. Forewing (Fig. 155) oblong-oval, broadest at about two-thirds the length; costal break and rudimentary pterostigma present; fine spinules present throughout all cells; cell  $m_1$  small; vein  $M_{1+2}$  reaching to wing apex; cell  $cu_{1a}$  relatively long, with vein  $Cu_{1a}$  relatively weakly curved; vein *M* evenly curved; vein *Rs* moderately strongly curved to wing margin. Metatibia with 4 thick black apical spurs; basal metatarsus with 2 black spurs. Male proctiger (Fig. 230) simple; paramere (Fig. 231) moderately stout, without basal posterior thickened setae; aedeagus (Fig. 232) with large bulbous apex. Female terminalia (Fig. 284) shorter and more wedge-shaped than in most other species.

Measurements. See Table 3.

Holotype ♂ (on two slides), **Afghanistan**: Kamdesch, Bashguit, Nuristan, 2200 m, 17.vii.1952 (*Klapperich*) (BMNH).

Paratypes. 1 ♂, 1 ♀ and one specimen lacking genitalia, same data as holotype. One female is on the same slide as the holotype, with the wing on a separate slide labelled paratype.

HOST PLANT. Unknown.



COMMENTS. The name *klapperichi* is a manuscript name used by Vondráček. This species, which differs from other representatives of the genus in having 2 basal metatarsal spines and only 4 spines at the apex of the tibia. It is somewhat atypical and represents the easternmost record for the genus *Livilla*.

### The *radiata*-group

Members of this group can be recognised by the strongly upturned apex of vein *Rs* and the vein  $M_{1+2}$  which reaches the wing margin well above the wing apex.

#### *Livilla radiata* (Förster) comb. n.

(Figs 98, 125, 126, 200–202)

*Arytaina radiata* Förster, 1848: 70. Holotype ♀, AUSTRIA [not examined].

*Psylla lactea* Costa, 1863: 47; Löw, 1877: 125; 1883: 241; Puton, 1876: 284. Type [sex not stated], ITALY [not examined]. [Synonymised by Löw, 1877: 125.]

*Psyllodes cytisi* Becker, 1867: 113; Löw, 1879: 595; 1883: 236. Type [incomplete data], U.S.S.R. [not examined]. [Synonymized by Löw, 1879: 595.]

*Psylla radiata* (Förster) Löw, 1877: 125.

*Alloeoneura radiata* (Förster) Löw, 1879: 595; 1882a: 168; 1883: 248; 1884: 150; 1888a: 20; Horvath, 1886: 315; 1918: 59; Duda, 1892: 38; Aulmann, 1913: 35; Oshanin, 1912: 128; Sulc, 1905a: 4; Haupt, 1935: 241; Prohaska, 1928a: 5; Klimaszewski, 1964: 65; 1965: 203; 1967: 13; 1969a: 46; 1973: 189; 1975: 132; Loginova, 1964: 464; 1966: 135; 1976a: 599; Lauterer, 1963: 148; 1977: 98; Vondráček, 1951b: 127; 1957: 189; Wagner & Franz, 1961: 162; Dobreanu & Manolache, 1962: 137; Andrianova & Klimaszewski, 1983: 38; Glowacka & Harisanov, 1983: 64.

*Alloeoneura radiata* (Förster); Puton, 1886: 93; Hueber, 1904: 276. Oshanin, 1907: 368. [Mis-spelling.]

*Aleuroneura radiata* (Förster); Klimaszewski, 1961: 79. [Mis-spelling.]

DESCRIPTION. Coloration. Mature specimens with head and thorax yellowish brown. Abdomen brown with yellow intersegmental membranes; genitalia yellow-brown; forewing membrane translucent white, veins yellow, markings chocolate brown; antennae yellow, apices of segments 3–8 brown, segments 9 and 10 completely brown; legs yellowish brown; apices of tibiae and tarsi dark brown.

Structure. Head (Fig. 126) with genal cones long and slender, much longer than the vertex. Forewing (Fig. 125) oblong-oval, very short and broad; costal break and pterostigma usually absent; fine spinules present throughout all cells; vein *Rs* short, strongly curved to wing margin; vein *M* short, slightly sinuous; vein  $M_{1+2}$  meeting wing margin well above the apex; cell  $cu_{1a}$  short and relatively high, vein  $Cu_{1a}$  strongly arched. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 200) simple; paramere (Fig. 201) without thickened setae along basal posterior margin; aedeagus (Fig. 202) with slightly reniform apex. Female terminalia as in Fig. 98.

Measurements. See Table 3.

#### MATERIAL EXAMINED

2 ♂, 3 ♀, Austria, West Germany and Czechoslovakia (BMNH, DB).

HOST PLANTS. *Chamaecytisus ratisbonensis* (Schaeffer) Rothm., *Chamaecytisus austriacus* (L.) Link, *Chamaecytisus borysthenicus* (Gruner) A. Klaskova, *Lemboptropis nigricans* (L.) Griseb.

PUBLISHED DISTRIBUTION. Austria (Förster, 1848; Löw, 1863, 1888a; Prohaska, 1928a; Haupt, 1935; Wagner & Franz, 1961), Bulgaria (Klimaszewski, 1965; Glowacka & Harisanov, 1983), Czechoslovakia (Löw, 1888a; Duda, 1892; Sulc, 1905a; Haupt, 1935; Vondráček, 1957; Lauterer, 1977), Hungary (Löw, 1888a; Horvath, 1886, 1918), Italy (Aulmann, 1913), Poland (Klimaszewski, 1961, 1964, 1967, 1969, 1975), Rumania (Dobreanu & Manolache, 1962), U.S.S.R., southern European part (Loginova, 1964, 1966; Andrianova & Klimaszewski, 1983), Yugoslavia (Löw, 1888a; Aulmann, 1913), 'S. Germany' (Haupt, 1935).

COMMENTS. This species has been recognised as the type-species of the monotypic genus *Alloeoneura* Löw, 1879 for over 100 years. There is, however, little reason why it should be regarded as a distinct genus. *L. radiata* is distinguished by the short broad wing, with the characteristic pattern, and the very long genal cones.

***Livilla retamae* (Puton) comb. n.**

(Figs 119, 120, 191–193, 291)

*Psylla retamae* Puton, 1878: 134; Bolivar & Chicote, 1879: 184. Syntypes 6 ♂, 12 ♀, 1 ?sex, SPAIN (MM, MNHN) [examined].

*Floria retamae* (Puton) Löw, 1883: 248; Puton, 1886: 93; Oshanin, 1907: 368; 1912: 128; Aulmann, 1913: 34; Ramirez Gomez, 1956: 85; Loginova, 1976a: 599; Klimaszewski, 1973: 194; Samy, 1973: 452; Halperin *et al.*, 1982: 34.

*Floria* (*Brinckitia*) *retamae* (Puton); Loginova, 1971: 629; 1972a: 27.

*Alloeoneura retamae* (Puton) Vondráček, 1951b: 127.

**DESCRIPTION.** Coloration. Immature specimens greenish throughout, developing pale orange markings on dorsum of thorax. Mature specimens with genae, vertex and dorsum of thorax dirty yellow, with orange markings on thorax and vertex; ventral parts of head and thorax pale orange-yellow; dorsal abdominal sclerites brown, intersegmental membranes yellow; underside of abdomen greenish to brown; genitalia dirty yellow to brown; forewing membrane clear, veins clear to pale yellow; pattern brown; antennae dirty yellow, segments 3–6 darkened apically, segments 6–10 dark brown; legs dirty yellow.

**Structure.** Head (Fig. 120) with genal cones slender, longer than the vertex, with narrowly rounded apices. Forewing (Fig. 119) elongate oblong-oval; costal break and rudimentary pterostigma present; spinules absent or thinly scattered in areas of brown patterning; vein *Rs* curved towards wing margin; vein *M* sinuous; vein *M*<sub>1+2</sub> meeting wing margin well before apex; cell *cu*<sub>1a</sub> moderately large, vein *Cu*<sub>1a</sub> strongly arched. Metatibia with 5 thick black spurs, basal metatarsus without black spurs. Male proctiger (Fig. 191) simple; paramere (Fig. 192) slightly expanded subapically, inner tooth partially hidden in side view; aedeagus (Fig. 193) with slightly hooked apex. Female terminalia as in Fig. 291.

Measurements. See Table 3.

**MATERIAL EXAMINED**

16 ♂, 32 ♀, **Israel, Egypt, Algeria, Morocco, Portugal and Spain** (IDH, ZI, ZMU, BMNH, MM, MNHN, DB, PL).

**HOST PLANTS.** *Retama sphaerocarpa* (L.) Boiss, *R. monosperma* (L.) Boiss and *R. raetam* (Forskal) Webb & Berth.

**MOROCCO DISTRIBUTION.** Algeria (Aulmann, 1913), Egypt (Samy, 1973), Israel (Halperin *et al.*, 1982), Morocco (Loginova, 1972a), Portugal (Aulmann, 1913), Spain (Puton, 1878; Bolivar & Chicote, 1879; Vondráček, 1951b; Ramirez Gomez, 1956).

**COMMENTS.** A widely distributed species which occurs right across the southern part of the Mediterranean Basin. It is distinguished from other members of the genus by the characteristic pattern and somewhat oblong shape of the forewing.

***Livilla lautereri* sp. n.**

(Figs 121, 122, 194–196, 292)

**DESCRIPTION.** Coloration. Available specimens do not appear to have developed the full mature coloration. General coloration of head and thorax brownish yellow, abdomen slightly darker above; genitalia brown; forewing membrane clear with very pale yellow clouds and very distinct dark brown markings towards apex; veins yellowish basally becoming dark brown at wing apex; antennae brownish yellow, segments becoming infusate towards apex; legs yellowish brown.

**Structure.** Head (Fig. 122) with genal cones widely separate and longer than vertex. Forewing (Fig. 121) oblong-oval, almost parallel-sided, with broadly rounded apex; spinules confined to apical cells and around base of vein *Cu*<sub>2</sub>; costal break and pterostigma absent; vein *Rs* strongly curved to wing margin; vein *M* evenly curved; vein *M*<sub>1+2</sub> reaching wing margin well above apex; cell *cu*<sub>1a</sub> moderately large, vein *Cu*<sub>1a</sub> straight in apical half. Metatibia with 4 or 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 194) simple; paramere (Fig. 195) with highly serrated anterior margin and large apical tooth; aedeagus (Fig. 196) very thin with angular apex. Female terminalia as in Fig. 292.

Measurements. See Table 3.

Holotype ♂, **Algeria:** Massiv de l'Aures, 6 km Arris, 1300 m, 6.vi.1980 (*Remane*) (BMNH).

Paratype. 1 ♀, same data as holotype.

**HOST PLANT.** Unknown.



COMMENTS. The forewing shape is similar to *L. retamae* but the pattern is quite different and characteristic, separating *L. lautereri* from other members of the genus.

***Livilla syriaca* (Löw) comb. n.**

(Figs 123, 124, 197–199, 286)

*Floria syriaca* Löw, 1882b: 262; 1883: 252; Puton, 1886: 93; Oshanin, 1907: 368; 1912: 128; Aulmann, 1913: 35; Loginova, 1976a: 599; Halperin *et al.*, 1982: 34. Holotype ♀, SYRIA [not located, missing from Löw collection (NM)].

*Floria syriac[e]a* Löw; Klimaszewski, 1973: 194. [Mis-spelling.]

DESCRIPTION. Coloration. Mature specimens with dorsum of thorax shining chocolate brown, remainder of thorax brownish yellow, occasionally with a greenish tinge; vertex and genal cones brownish yellow, occasionally greenish, marked along posterior and eye margins in darker brown; abdomen with dorsal sclerites brown, intersegmental membranes yellowish or greenish; ventral sclerites brown, occasionally greenish; genitalia yellow-brown to brown; forewing membrane clear to pale yellow, veins yellow to dark brown where they are overlaid with dark brown maculations; antennae yellowish brown, apices of segments 3–8 and whole of segments 9 and 10 brown.

Structure. Head (Fig. 124) with genal cones triangular, widely divergent, about equal in length to vertex. Forewing (Fig. 123) oblong-oval but becoming broader towards the somewhat truncate apex; costal break and rudimentary pterostigma present; vein *Rs* strongly curved towards margin; vein *M* strongly sinuous; vein  $M_{1+2}$  meeting wing margin well above apex; cell  $cu_{1a}$  relatively tall, vein  $Cu_{1a}$  strongly curved. Metatibia with 5 thick black spurs; basal metatarsus with 1 spur. Male proctiger (Fig. 197) simple; paramere (Fig. 198) long and slender without thickened setae on basal posterior margin; aedeagus (Fig. 199) bulbous and slightly recurved at apex. Female terminalia as in Fig. 286.

Measurements. See Table 3.

MATERIAL EXAMINED

2 ♂, 13 ♀, **Cyprus** (BMNH, MM).

HOST PLANT. *Genista fasselata* Decne and *Genista acanthoclada* D.C.

PUBLISHED DISTRIBUTION. Syria (Löw, 1882b) and possibly Israel (Halperin *et al.*, 1982).

COMMENTS. The types of this species are missing from the Löw collection in the NM, Vienna. We have followed Loginova's interpretation of the species which is, in all probability, correct. This species is distinguished by the forewing, which is strongly narrowed toward the base, and by the widely divergent genal cones.

**The *spartiisuga*-group**

Members of this group are characterised by the forewing pattern consisting primarily of small round maculations.

***Livilla spartiisuga* (Puton) comb. n.**

(Figs 137, 138, 218–220, 276)

*Psylla spartiisuga* Puton, 1876: 283. Lectotype ♂, ALGERIA (MNHN), here designated [examined].

*Floria spartiisuga* (Puton) Löw, 1879: 593; 1883: 251; Puton, 1886: 92; Oshanin, 1907: 367; 1912: 128; Aulmann, 1913: 34; Loginova, 1971: 629; 1976a: 599.

DESCRIPTION. Coloration. Mature specimens with dorsum of thorax orange-red with brownish markings; head including genal cones orange; abdominal sclerites brown, intersegmental membranes reddish orange; genitalia orange-brown to dark brown; forewing membrane clear to pale yellow, veins yellow, maculations pale brown; antennae yellow with apices of segments black; legs yellowish orange.

Structure. Head (Fig. 138) with genal cones slightly longer than vertex, stout and broadly rounded. Forewing (Fig. 137) elongate oblong-oval; with costal break and rudimentary pterostigma present; spinules present throughout all cells; vein *Rs* moderately strongly curved towards margin; vein *M* evenly curved throughout; vein  $M_{1+2}$  reaching to wing apex; cell  $cu_{1a}$  moderately long and flat. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 218) simple; paramere (Fig. 219) long and slender; aedeagus (Fig. 220) with rounded bulbous apex. Female terminalia as in Fig. 276.

Measurements. See Table 3.

**MATERIAL EXAMINED**

Lectotype ♂, **Algeria**: Bône, with Puton type label (MNHN). 2 ♂, 4 ♀ paralectotypes, same data as lectotype (MNHN).

HOST PLANT. *Genista* sp.

PUBLISHED DISTRIBUTION. Algeria (Puton, 1876).

COMMENTS. This species is close to *siciliensis* and known only from the type series. It can be separated from all other 'spotted-wing' species by the absence of maculations from a band stretching primarily across cell  $r_s$  of the forewing.

*Livilla siciliensis* sp. n.

(Figs 131, 132, 209–211, 273)

DESCRIPTION. Coloration. Immature specimens pale greenish to yellow throughout. Some of the more mature specimens are more yellowish and are beginning to develop orange markings on the dorsum of the thorax and vertex and the abdominal sclerites are beginning to darken. Genitalia yellow to brown; forewing membrane clear to pale yellowish, veins yellowish to pale brown; maculations brown; antennal segments 1–4 yellow, segments 3–4 infusate at apex; segments 5–10 dark brown; legs dirty yellow.

Structure. Head (Fig. 132) with genal cones rather stout, about as long as vertex, with broadly rounded apices. Forewing (Fig. 131) oblong-oval, almost parallel-sided; costal break and rudimentary pterostigma present; fine spinules present throughout all cells; vein  $R_s$  curved towards margin; vein  $M$  long and very slightly sinuous; cell  $m_{1+2}$  small. Vein  $M_{1+2}$  reaching to wing apex; cell  $cu_{1a}$  relatively flat. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 209) simple; paramere (Fig. 210) long and slender; aedeagus (Fig. 211) with slightly angular bulbous apex. Female terminalia as in Fig. 273.

Measurements. See Table 3.

Holotype ♂, **Italy**: Sicily, Palermo c. 750 m, 28.v.1979 (*D. & S. Sutton*) (BMNH).

Paratypes. 10 ♂, 18 ♀, same data as holotype except that some were collected on 26.v.1979 and 5.vi.1979.

HOST PLANT. *Genista* sp.

COMMENTS. Morphologically this species is closest to *L. maculipennis* but it is much larger.

*Livilla cataloniensis* (Hodkinson & White) comb. n.

(Figs 127, 128, 203–205, 271)

*Floria cataloniensis* Hodkinson & White, 1979a: 55. Holotype ♂, FRANCE (BMNH) [examined].

DESCRIPTION. Coloration. Mature specimens with dorsal surface of head and thorax orange-yellow with paler longitudinal markings; genal cones and underside of thorax brownish yellow; abdominal sclerites brown, often darker above; intersegmental membranes yellow, occasionally with greenish tinge in younger specimens; genitalia yellow to yellow-brown; forewing membrane clear to very pale yellow throughout, maculae brown; antennal segments 1–2 yellow; segments 3–7 yellow with infusate apex; segments 9–10 dark brown; legs brownish yellow.

Structure. Head (Fig. 128) with genal cones conical, slightly longer than the vertex, with narrowly rounded apices. Forewing (Fig. 127) oblong-oval with broadly rounded apex; pterostigma rudimentary; costal break occasionally present; fine spinules present throughout all cells; vein  $R_s$  weakly curved towards margin; vein  $M$  evenly curved; vein  $M_{1+2}$  reaching to wing apex; cell  $cu_{1a}$  short and high; vein  $Cu_{1a}$  strongly arched. Metatibia with 5 thick black apical spurs at apex; basal metatarsus with 1 black spur. Male proctiger (Fig. 203) simple; paramere (Fig. 204) relatively stout and straight, without thick basal setae along posterior margin; aedeagus (Fig. 205) with bulbous apex. Female terminalia as in Fig. 271.

Measurements. See Table 3.

**MATERIAL EXAMINED**

♂ holotype, **France**: Pyrénées-Or., Argeles, 16.v.1977 (*White*) (BMNH). 15 ♂, 21 ♀ including paratypes, **France** and **Spain** (BMNH, IDH). There is also a lot of material from unnamed localities in the Heslop-Harrison collection (BMNH).



HOST PLANT. *Ulex parviflorus* Pourt. et.

PUBLISHED DISTRIBUTION. France and Spain (Hodkinson & White, 1979a).

COMMENTS. This species can be distinguished from other spotted-wing species by the relatively broader forewing.

***Livilla hodkinsoni* (Burckhardt) comb. n.**

(Figs 139, 140, 221–223, 277)

*Floria hodkinsoni* Burckhardt, 1979: 391. Holotype ♂, GREECE (ETH) [examined].

DESCRIPTION. Coloration. Immature specimens bright green throughout with orange markings on dorsum of head and thorax. Mature specimens with dorsal surface of head and thorax brown with yellow markings; underside of head and thorax with dark brown markings; abdominal sclerites dark brown, intersegmental membranes paler; genitalia yellow-brown to brown; forewing membrane clear to pale yellow with brown maculations; antennal segments 1–7 yellow, segments 4–7 infusate at apex; segments 8–10 dark brown; legs brownish yellow.

Structure. Head (Fig. 140) with genal cones longer than vertex, with somewhat angular apices. Forewing (Fig. 139) oblong-oval, with rudimentary pterostigma and costal break present; fine spinules present throughout all cells; vein *R*<sub>s</sub> moderately strongly curved towards margin; vein *M* slightly sinuous; vein *M*<sub>1+2</sub> reaching to just below the wing apex; cell *cu*<sub>1a</sub> moderately long, of characteristic shape. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 221) simple; paramere (Fig. 222) without thickened basal posterior setae; aedeagus (Fig. 223) with bulbous apex. Female terminalia as in Fig. 277.

Measurements. See Table 3

MATERIAL EXAMINED

♂ holotype, Greece: Pelopones, Bilos, 16.v.1979 (*Burckhardt*) (ETH). 13 ♂, 15 ♀ including paratypes, Greece, including Crete (ETH, DB, BMNH, MM, PL).

HOST PLANT. *Genista acanthoclada* D.C., not a *Cytisus* species as stated in the original description (*Burckhardt*, pers. comm.).

PUBLISHED DISTRIBUTION. Greece (*Burckhardt*, 1979).

COMMENTS. *L. hodkinsoni* is closest to *L. cataloniensis* from which it is separated by the shape of cells *m*<sub>1</sub> and *cu*<sub>1a</sub> of the forewing.

***Livilla maculipennis* sp. n.**

(Figs 129, 130, 206–208, 272)

DESCRIPTION. Coloration. Body colour of immature specimens bright green to yellow, usually with orange or orange-brown markings on dorsum of vertex and thorax. Mature specimens darker, general colour pale brown with darker brown markings; abdominal sclerites dark brown with yellow intersegmental membranes; forewing membrane clear, veins pale yellow, maculations brown; antennal segments brownish yellow basally becoming dark brown towards apex.

Structure. Head (Fig. 130) with genal cones divergent, narrowly rounded at apex, slightly longer than vertex. Forewing (Fig. 129) elongate, oblong-oval, almost parallel-sided, pterostigma almost lost, costal break often present; fine spinules present throughout all cells; vein *R*<sub>s</sub> moderately strongly curved towards wing margin; vein *M* slightly sinuous; vein *M*<sub>1+2</sub> reaching to wing apex; cell *cu*<sub>1a</sub> very long and low. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 206) simple; paramere (Fig. 207) curved posteriorly beyond middle, with numerous thickened setae on basal posterior margin; aedeagus (Fig. 208) with apex somewhat reniform. Female terminalia as in Fig. 272.

Measurements. See Table 3.

Holotype ♂, Spain: Huelva, 26 km, S. Almonte, 13.vi.1977 (*Hollis*) (BMNH).

Paratypes. Spain: 11 ♂, 11 ♀, same data as holotype. Algeria: 7 ♂, 3 ♀, Theniet al Had, Zedernwald, 1700 m, 31.vii.1980 (*Remane*) (PL); 10 ♂, 6 ♀, N El Gor, 900 m, 28.vii.1980 (*Remane*) (PL); 7 ♂, 11 ♀, Monte de Tlemcen, 18 km NW. Sebdou, 27.vii.1980 (*Remane*) (PL). Morocco: 1 ♂, N Taferat, 25.vii.1980 (*Remane*) (PL).

HOST PLANT. *Genista* sp.

COMMENTS. *L. maculipennis* is separated from the other spotted-wing species by its small size and the elongate cell  $cu_{1a}$  of the forewing.

***Livilla pyrenaea* (Mink) comb. n.**

(Figs 133, 134, 212–214, 274)

*Psylla pyrenaea* Mink, 1859: 430. Syntypes, FRANCE [not located].

*Floria pyrenaea* (Mink) Löw, 1879: 592; 1883: 247; Chicote, 1880: 202; Puton, 1871: 438; 1886: 92; Oshanin, 1907: 367; 1912: 128; Aulmann, 1913: 34; Vondráček, 1951*b*: 128; Loginova, 1976*a*: 599; Hodkinson & White, 1979*a*: 57.

*Floria (Floriella) pyrenaea* (Mink); Ramirez Gomez, 1956: 87.

*Floria pyrenaea* (Mink); Klimaszewski, 1973: 194. [Mis-spelling.]

DESCRIPTION. Coloration. Mature specimens with dorsal surface of head and thorax dark orange or orange-brown with paler longitudinal markings; genal cones and underside of thorax brownish yellow; abdominal sclerites dark brown with yellow intersegmental membranes, often with a greenish tinge in less mature specimens; genitalia yellow to brown; forewing membrane clear; maculae brown, absent from area adjacent to wing margin, making leading edge of wing appear white from a distance; antennal segments 1–2 yellow; segments 3–7 yellow with infusate apex; segments 9–10 brown; legs brownish yellow.

Structure. Head (Fig. 134) with genal cones somewhat triangular, divergent, longer than vertex. Forewing (Fig. 133) oblong-oval with a somewhat truncate apex; costal break and pterostigma usually absent; fine spinules present throughout all cells; vein *Rs* curved towards wing margin; vein *M* evenly curved; vein  $M_{1+2}$  reaching to wing apex; cell  $cu_{1a}$  moderately long. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 212) simple; paramere (Fig. 213) relatively short, parallel-sided; aedeagus (Fig. 214) robust, with slightly reniform apex. Female terminalia as in Fig. 274.

Measurements. See Table 3.

MATERIAL EXAMINED

20 ♂, 19 ♀, **France and Spain** (BMNH, IDH, MM).

HOST PLANTS. *Calicotome spinosa* (L.) Link. and *Genista pilosa* L.

PUBLISHED DISTRIBUTION. Spain (Chicote, 1880; Ramirez Gomez, 1956; Hodkinson & White, 1979*a*), France (Mink, 1859; Puton, 1871; Vondráček, 1951*b*, Hodkinson & White, 1979*a*).

COMMENTS. A characteristic species with maculations absent from the leading margin of the forewing. It also differs from other spotted-wing species by having a slightly obliquely truncated wing apex.

***Livilla bimaculata* sp. n.**

(Figs 149, 150, 254–256, 280)

DESCRIPTION. Coloration. Mature specimens with dorsal surface of head and thorax pale reddish brown with paler markings; genal cones and ventral parts of thorax brownish yellow; abdominal sclerites dark brown; intersegmental membranes yellowish; genitalia brown; forewing membrane two-tone, clear and yellow-brown; maculae generally mid brown, those around the apex of vein *Rs* darker, almost black; antennae with segments 1–4 primarily yellow, segments 6–10 primarily dark brown; legs brownish yellow.

Structure. Head (Fig. 150) with genal cones somewhat divergent, as long as vertex. Forewing (Fig. 149) elongate oval, broadest in basal half; fine spinules present throughout all cells; vein *Rs* strongly curved towards wing margin; vein *M* sinuous; vein  $M_{1+2}$  reaching to wing apex; pterostigma at most rudimentary; costal break occasionally present. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 254) simple; paramere (Fig. 255) slender, with numerous stout spines on basal posterior margin; aedeagus as in Fig. 256. Female terminalia as in Fig. 280.

Measurements. See Table 3.

Holotype ♂, **France**: Corsica, Gorge du Ristomica nr Corte, 12.vi.1976, on *Genista* sp. (*J.M.P.*) (BMNH).

Paratypes. 6 ♂, 10 ♀, same data as holotype. **Italy**: 4 ♂, 4 ♀, Sardinia, Genova Borzonasea, Passo, Boco (*Conci*) 16.vi.1984 (IDH).

HOST PLANT. *Genista salzmanii* DC.



*Comments.* This species is separated from other 'spotted-wing' *Livilla* species by the presence of a much darker patch of maculations around vein *Rs*.

***Livilla blandula* (Horvath) comb. n.**

(Figs 144–146, 236–238, 278)

*Floria blandula* Horvath, 1905: 277; Oshanin, 1907: 368; 1912: 128; Aulmann, 1913: 34; Ramirez Gomez, 1956: 84; Klimaszewski, 1973: 193; Loginova, 1976a: 599. LECTOTYPE ♂, SPAIN (TM) here designated [examined].

[*Floria maura* Vondráček sensu Loginova, 1972a: 27. Misidentification.]

**DESCRIPTION.** Coloration. Body colour of immature specimens brownish yellow. Mature specimens with dorsum of thorax and vertex chocolate brown with white markings; genal cones and underside of thorax brownish yellow; dorsum of abdomen brown, remainder pale green to yellow; genitalia greenish yellow to brown; forewing membrane two-tone, clear and yellow-brown; maculae mid to dark brown; antennae with segments 1–5 primarily yellow, segments 6–10 primarily brown.

Structure. Head (Fig. 146) with genal cones slightly longer than vertex, slightly divergent, with apices narrowly rounded. Forewing (Figs 144, 145) oblong-oval; costal break and rudimentary pterostigma often present; fine spinules present throughout all cells; vein *Rs* weakly curved towards wing margin; vein *M* slightly sinuous; vein  $M_{1+2}$  reaching to wing apex. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 236) simple; paramere (Fig. 237) with numerous thick setae on basal posterior margin; aedeagus (Fig. 238) with slightly hooked apex. Female terminalia as in Fig. 278.

Measurements. See Table 3.

**MATERIAL EXAMINED**

Lectotype ♂, **Spain**: 'Hispania. Ciudad Real, det. Horvath' (TM).

1 ♂, 4 ♀ (paralectotypes), same data as lectotype; 19 ♂, 27 ♀, **Portugal, Morocco** (BMNH, ZMU, ZI).

**HOST PLANT.** *Genista hirsuta* Vahl.

**PUBLISHED DISTRIBUTION.** Spain (Horvath, 1905), Morocco (Loginova, 1972a).

**COMMENTS.** This is the species illustrated as *maura* by Loginova (1972a). The forewing of *maura* is relatively broader and with only scattered indistinct maculations. This species shows considerable variation in the wing pattern and the two extremes are illustrated for comparison. *Livilla blandula* is closest to *L. lusitanica* and *L. pseudoretamae*. It can be distinguished from the former by the narrower forewing and from the latter by the lack of a distinct dark brown forewing pattern.

***Livilla pseudoretamae* sp. n.**

(Figs 157, 158, 233–235, 285)

**DESCRIPTION.** Coloration. Vertex, genal cones and dorsum of thorax pale greyish brown, occasionally with a greenish tinge, thorax with chocolate brown markings; abdominal sclerites ranging from green to brown, with pale intersegmental membranes; genitalia dirty yellow to brown; forewing membrane clear, veins yellow to very pale brown; wing pattern light chocolate-brown; antennae dirty yellow basally, segments 5–10 dark brown; legs brownish yellow throughout. The specimens to hand have probably not developed their full coloration.

Structure. Head (Fig. 158) with genal cones slightly longer than vertex, with evenly rounded apices. Forewing (Fig. 157) oblong-oval; with costal break and rudimentary pterostigma present; fine spinules present throughout all the cells; vein *Rs* moderately strongly curved towards margin; vein *M* moderately sinuous; vein  $M_{1+2}$  short but reaching to wing apex; cell  $cu_{1a}$  short and high, vein  $Cu_{1a}$  strongly arched. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 233) simple; paramere (Fig. 234) straight, with thickened setae present on basal posterior margin; aedeagus (Fig. 235) with a slightly hooked apex. Female terminalia as in Fig. 285.

Measurements. See Table 3.

Holotype ♂, **Algeria**: Gran Kabylie, Djurdjura, 3.viii.1980 (*Remane*) (BMNH).

Paratypes. 2 ♂, 5 ♀, same data as holotype; 3 ♂, 9 ♀, Kabylie, Col de Talmetz (*Remane*). (BMNH, PL.)

**HOST PLANT.** Unknown.

COMMENTS. This species is very close to *L. blandula* but the wing pattern, which lacks the characteristic spots, is more distinct and superficially resembles that of *Livilla retamae*.

***Livilla lusitanica* sp. n.**

(Figs 147, 148, 251–253, 279)

DESCRIPTION. Coloration. Mature specimens with dorsum of head and thorax brown with whitish markings; genal cones and underside of thorax brownish yellow; abdominal sclerites dark brown, intersegmental membranes yellowish brown; genitalia brown; forewing membrane two-tone, clear and yellow-brown; maculae mid to dark brown; antennae with segments 1–5 primarily yellow, segments 6–10 primarily dark brown; legs brownish yellow.

Structure. Head (Fig. 148) with genal cones stout, about as long as vertex. Forewing (Fig. 147) broadly oblong-oval, with costal break and rudimentary pterostigma present; fine spinules present throughout all cells; vein *Rs* moderately strongly curved towards wing margin; vein *M* slightly sinuous; vein  $M_{1+2}$  reaching wing apex; cell  $cu_{1a}$  strongly curved. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 251) simple; paramere (Fig. 252) stout, with dense thickened setae on the basal posterior margin; aedeagus (Fig. 253) with apex somewhat reniform. Female terminalia as in Fig. 279.

Measurements. See Table 3.

Holotype ♂, **Portugal**: 29 km E. Coimbra, 21.vi.1977 (*Hollis*) (BMNH).

Paratypes. 7 ♂, 10 ♀, same data as holotype; 3 ♂, 3 ♀, Porto, 2–12.viii.1962 (*J. Abraham & L. Horascek*) (BMNH).

HOST PLANT. *Genista triacanthos* Brot.

COMMENTS. This species resembles *blandula* in several respects but the forewing is consistently shorter and broader and the genal cones slightly shorter.

***Livilla magna* sp. n.**

(Figs 135, 136, 215–217, 275)

DESCRIPTION. Coloration. Immature specimens pale green to yellow throughout. Mature specimens with vertex and dorsum of thorax brownish yellow with orange or chocolate brown markings; underside of thorax often with most of sclerites dark brown to black; genal cones brownish yellow; sclerites of abdomen dark brown, occasionally paler along ventral parts; intersegmental membranes brownish yellow; forewing two-tone, clear to pale yellow contrasted with amber; maculations medium brown; antennal segments 1–4 yellow, segments 3–4 infusate at apex; segments 5–10 dark brown; legs brownish yellow, femora occasionally darkened above.

Structure. Head (Fig. 136) with divergent triangular genal cones as long as vertex. Forewing (Fig. 135) elongate oblong oval; rudimentary pterostigma and costal break present; vein *Rs* moderately curved to margin; fine spinules present in all cells; cells  $cu_{1a}$  and  $m_{1+2}$  of average size for genus; vein  $M_{1+2}$  reaching to wing apex. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 215) simple; paramere (Fig. 216) long and thin with a kink in the middle; aedeagus (Fig. 217) long with an angular bulbous apex. Female terminalia as in Fig. 275.

Measurements. See Table 3.

Holotype ♂, **Italy**: Sicily, Catania, 1.vi.1979 (*D. & S. Sutton*) (BMNH).

Paratypes. 5 ♂, 9 ♀, same data as holotype; 2 ♂, 8 ♀, same data as holotype except 4.vi.1979; 1 ♂, 7 ♀, Sicily, Etna, 1100 m, 16.vii.1977 (*D'Illro*) (PL); 1 ♂, 3 ♀, Sicily, Etna, 1100 m, 19.ix.1977 (*Asche*) (PL).

HOST PLANT. *Genista aetnensis* (Biv.) DG.

COMMENTS. This species is much larger than the other spotted-wing species. Morphologically it is closest to *L. siciliensis* but it differs in the shape of the forewing and details of the male genitalia.

***Livilla poggii* (Conci & Tamanini) comb. n.**

(Figs 141–143, 224–226, 281)

*Floria poggii* Conci & Tamanini, 1984a: 43. Holotype ♂, ITALY: Sardinia (MCSN) [not examined].

DESCRIPTION. Coloration. General coloration dirty yellow to greyish yellow throughout, occasionally with brown markings on the dorsum of the thorax; genitalia yellow to dark brown; forewing membrane clear to



yellowish but covered in brown maculations which are often coalescent; in the female the maculations are spread throughout the wing whereas in the male there is a transverse maculation-free band across the middle; also in the latter the apical maculations appear darker than the basal ones; antennal segments 1–8 yellow, segments 3–8 apically infusate; segments 9–10 dark brown; legs orange-yellow.

**Structure.** Head (Fig. 143) with genal cones weakly divergent, with narrowly rounded apices, about as long as vertex. Forewing (Figs 141, 142) elongate oval, more so in the female; costal break and pterostigma usually absent; fine spinules present in all cells; vein  $R_s$  strongly curved towards wing margin; vein  $M$  strongly sinuous; vein  $M_{1+2}$  meeting margin just above wing apex; cell  $cu_{1a}$  short and tall; vein  $Cu_{1a}$  strongly arched. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 224) simple; paramere (Fig. 225) relatively short and stout; aedeagus (Fig. 226) with an irregularly angled apex. Female terminalia as in Fig. 281.

Measurements. See Table 3.

#### MATERIAL EXAMINED

2 ♂, 3 ♀ (paratypes), **Italy** (IDH).

**HOST PLANT.** *Genista corsica* (Loisel.) DC in Lam. & DC.

**PUBLISHED DISTRIBUTION.** Italy, Sardinia (Conci & Tamanini, 1984a).

**COMMENTS:** This is an interesting species which is strongly sexually dimorphic in the wing-pattern, an unusual occurrence in the psyllids. The host plant is endemic to Sardinia and Corsica.

### Residual assemblage

#### *Livilla spectabilis* (Flor) comb. n.

(Figs 161, 162, 242–244, 268)

*Psylla spectabilis* Flor, 1861: 362. Syntypes ♂, ♀ FRANCE (not located).

*Floria spectabilis* (Flor) Löw, 1879: 594; 1883: 251; 1888a: 20; Chicote, 1880: 202; Ferrari, 1888: 76; Puton, 1886: 93; Oshanin, 1907: 368; 1912: 128; Aulmann, 1913: 34; Horvath, 1918b: 331; Haupt, 1935: 242; Schaefer, 1949a: 56, 1949b: 31; Vondráček, 1951b: 128; Klimaszewski, 1968b: 781; 1973: 194; Novak & Wagner, 1962: 43; Loginova, 1976a: 599; Burckhardt, 1983: 54.

**DESCRIPTION.** Coloration. Immature specimens pale green to greenish yellow throughout. Mature specimens with genal cones, vertex and dorsum of thorax dirty orange-yellow with darker orange and paler streaks; abdominal sclerites dark brown, intersegmental membranes orange-yellow; genitalia orange-yellow to brown; forewing membrane clear basally becoming orange-brown apically, with a dark spot around vein  $Cu_{1a}$ ; antennae dirty yellow, except segments 3 and 4 apically darkened, segments 5 to 10 brown; legs dirty yellow.

**Structure.** Head (Fig. 162) with massive genal cones which are much longer than the vertex. Forewing (Fig. 161) elongate oval, of characteristic shape, with a strongly curved costal margin throughout; costal break and rudimentary pterostigma normally absent; fine spinules present throughout all cells; vein  $R_s$  weakly curved towards margin; vein  $M$  evenly curved; vein  $M_{1+2}$  reaching to wing apex; cell  $cu_{1a}$  relatively small; vein  $Cu_{1a}$  strongly arched. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 242) simple; paramere (Fig. 243) straight and slender; aedeagus (Fig. 244) with recurved apex. Female terminalia as in Fig. 268.

Measurements. See Table 3.

#### MATERIAL EXAMINED

10 ♂, 9 ♀, **Italy, Greece** including **Crete, Yugoslavia, France** (MM, BMNH, IDH, DB, PL). There is 1 ♂, 1 ♀ in the ZI, Leningrad labelled Uppsala, Sweden, F. Ossiannilsson. Dr Ossiannilsson informs us that this is a mistake; the species does not occur in Sweden.

**HOST PLANT.** *Spartium junceum* L.

**PUBLISHED DISTRIBUTION.** France (Puton, 1871), Italy (Ferrari, 1888), Portugal (Aulmann, 1913), Spain (Chicote, 1880), Switzerland (Schaefer, 1949a, b; Burckhardt, 1983).

**COMMENTS.** This species has no known close relative within the genus. It is separated from other members by the narrow forewing of characteristic shape and the very long genal cones.

*Livilla variegata* (Löw) comb. n.

(Figs 163, 164, 245–247, 269)

*Floria variegata* Löw, 1882b: 261; 1883: 253; 1888a: 20; Ferrari, 1888: 76; Puton, 1886: 92; Oshanin, 1907: 367, 1912: 128; Aulmann, 1913: 35; Klimaszewski, 1973: 194; Loginova, 1976a: 599; Hollis, 1978: 149; Hodkinson & Hollis, 1980: 171; Hodkinson & White, 1979a: 63; White & Hodkinson, 1982: 25; Burckhardt, 1983: 54. Syntypes, ♂ ♀, YUGOSLAVIA (MM) [examined].

*Floria alpina* Cerutti, 1939a: 447; 1939b: 583; Schaefer, 1949a: 55; 1949b: 31; Klimaszewski, 1973: 193; Loginova, 1976a: 599; Tamanini, 1977: 111. Lectotype ♂, SWITZERLAND (MZL) [not examined]. [Synonymised by Burckhardt, 1983: 54.]

**DESCRIPTION.** Coloration. Immature specimens pale green to greenish yellow with orange markings on dorsum of thorax. Mature specimens with dorsum of head and thorax orange-yellow with paler longitudinal markings; genal cones orange-yellow; abdominal sclerites dark brown, intersegmental membranes yellow; genitalia orange-brown; forewing membrane clear to pale yellow basally, apical suffusion grey to pale yellowish brown, veins pale yellow to very pale brown; antennae dirty yellow, apices of segments 3 to 6 and whole of segments 7 to 10 dark brown; legs dirty yellow.

**Structure.** Head (Fig. 164) with genal cones slender, slightly longer than vertex, with narrowly rounded apices. Forewing (Fig. 163) oblong-oval; costal break and rudimentary pterostigma present; veins very delicate; dense fine spinules present throughout all cells; vein *Rs* weakly curved to margin; vein *M* evenly curved; vein  $M_{1+2}$  reaching to wing apex; cell  $cu_{1a}$  strongly arched. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 245) simple; paramere (Fig. 246) slender, with thickened setae present on basal posterior margin; aedeagus (Fig. 247) with bulbous apex. Female terminalia as in Fig. 269.

Measurements. See Table 3.

**MATERIAL EXAMINED**

27 ♂, 32 ♀, Yugoslavia, Rumania, Italy, Switzerland, France, Spain, England (MM, IDH, BMNH, DB).

**HOST PLANTS.** *Laburnum anagyroides* Medicus and *Laburnum alpinum* (Miller) Berchtold & J. Presl.

**PUBLISHED DISTRIBUTION.** France (Hodkinson & White, 1979a), Great Britain (Hollis, 1978; Hodkinson & Hollis, 1980; White & Hodkinson, 1982), Italy (Ferrari, 1888; Tamanini, 1977), Switzerland (Cerruti, 1939a, b; Schaefer, 1949a, b; Burckhardt, 1983), Yugoslavia (Löw, 1882b; 1888a).

**COMMENTS.** *Floria alpina* was, for a long time, recorded as a separate alpine species but it has now been shown to be synonymous with *L. variegata*. *L. variegata* can be separated from other members of the genus by the broad forewing which lacks a distinct pattern and by the veins which are unusually fine and lightly coloured.

*Livilla genistae* Ramirez Gomez

(Figs 153, 154, 227–229, 283)

*Livilla genistae* Ramirez Gomez, 1956: 98; Klimaszewski, 1973: 195; Loginova, 1976a: 600. NEOTYPE ♂, SPAIN (BMNH) here designated.

**DESCRIPTION.** Coloration. Mature specimens with head and thorax yellowish brown with slightly darker reddish brown markings; abdominal sclerites occasionally darker than thorax, terminalia yellow-brown to brown; forewing membrane clear, without pattern; veins yellowish brown; antennal segments 1–2 yellow, segments 3–4 yellow and infusate at apex; segments 5–10 dark brown; legs brownish yellow.

**Structure.** Head (Fig. 154) with genal cones almost as long as vertex, somewhat divergent with broadly rounded apices. Forewing (Fig. 153) elongate oval without pterostigma or costal break; spinules present throughout all cells; vein *Rs* strongly curved towards wing margin; vein *M* evenly curved; vein  $M_{1+2}$  reaching to just below wing apex; cell  $cu_{1a}$  short and tall; vein  $Cu_{1a}$  strongly curved. Metatibia with 5 apical thick black spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 227) simple; paramere (Fig. 228) sinuous, with thick setae at base of posterior margin; aedeagus (Fig. 229) with weakly angled apex. Female terminalia (Fig. 283) with very short circumanal pore ring.

Measurements. See Table 3.

**MATERIAL EXAMINED**

Neotype ♂, Spain: Huesca, Barluenga, 1.vi.1976, on ? *Genista* (Hollis) (BMNH); 8 ♀, Spain (BMNH).



HOST PLANT. This was omitted from the original description: the name *genistae* suggests that it feeds on a '*Genista*' species. The neotype designated above was collected from a plant thought to be a *Genista* species while 4 of the additional females were collected from *Cytisus purgans*.

PUBLISHED DISTRIBUTION. Spain (Ramirez Gomez, 1956).

COMMENTS. The original type-material of this species has been destroyed. The above material collected in Spain corresponds closely with the original description. This species is somewhat intermediate between the short coriaceous wing *Livilla* species (*ulicis*-group) and the longer wing forms with spotted or longitudinally striped wing patterns (*spartiisuga*- and *horvathi*-groups). It is recognised by the oval wing and the absence of any wing patterning.

***Livilla adusta* (Löw) comb. n.**

(Figs 159, 160, 239–241, 267)

*Floria adusta* Löw, 1882*b*: 260; 1883: 230; Puton, 1886: 92; 1889: 113; Oshanin, 1907: 367; 1912: 128; Aulmann, 1913: 34; Klimaszewski, 1973: 193; Loginova, 1976*a*: 599. ? Holotype ♀, SPAIN [missing from Löw collection (NM)].

DESCRIPTION. Coloration. Immature specimens greenish yellow throughout, developing pale orange markings on dorsum of thorax. Mature specimens with genal cones, vertex and dorsum of thorax brownish orange with indistinct brown or paler markings; abdominal sclerites dark brown to black, intersegmental membranes orange-brown. Forewing two-tone, clear and orange-brown; veins yellow to yellow-brown; antennae dirty yellow, segments 3–4 darkened apically, segments 5–10 dark brown; legs dirty yellow.

Structure. Head (Fig. 160) with genal cones as long as vertex, slightly divergent with narrowly rounded apices; forewing (Fig. 159) elongate oblong-oval, with evenly rounded apex; costal break and pterostigma rudimentary; fine spinules present throughout all cells; veins *Rs* upturned to wing margin; vein  $M_{1+2}$  reaching to wing apex. Metatibia with 5 thick black spurs; basal metatarsus with 1 black spur. Male proctiger (Fig. 239) simple but broadest at base; paramere (Fig. 240) long, thin, parallel-sided, with large inner apical tooth, bearing a few stout setae at base of posterior margin; aedeagus as in Fig. 241. Female terminalia (Fig. 267) with a slightly upturned apex to the proctiger.

Measurements. See Table 3.

MATERIAL EXAMINED

9 ♂, 12 ♀, **Algeria** and **Spain** (BMNH, MNHN, MM).

HOST PLANT. Unknown. Some specimens in BMNH were collected from *Cytisus scoparius* ?

PUBLISHED DISTRIBUTION. Spain (Löw, 1882*b*; Aulmann, 1913).

COMMENTS. This species is not very close to any other member of the genus. It is easily recognised by the distribution of darker pigment along the forewing veins which gives a furrowed appearance.

***Livilla maura* (Vondráček) comb. n.**

(Figs 151, 152, 282)

*Floria maura* Vondráček, 1951*a*: 119; 1951*b*: 128; Klimaszewski, 1973: 193; Loginova, 1976*a*: 599. Syntypes ♀, MOROCCO (MM) [examined].

DESCRIPTION. Coloration. Mature specimens with vertex and dorsum of thorax deep brownish orange with darker brown markings; genal cones brown; abdomen dark brown to black, intersegmental membranes brownish orange; genitalia brownish yellow to dark brown; forewing membrane, pale brownish orange throughout, veins concolorous with membrane; apical pattern very diffuse, pale brown; antennae with segments 1–4 dirty yellow, 3–4 apically brown, the remaining segments brown; legs with femora pale brown, the remainder orange-yellow.

Structure. Head (Fig. 152) with genal cones about as long as vertex, relatively slender, with narrowly rounded apices. Forewing (Fig. 151) oblong-oval, relatively broad; costal break and rudimentary pterostigma present; fine spinules present throughout all cells; vein *M* evenly curved; vein  $M_{1+2}$  reaching to wing apex; cell  $cu_1$  relatively short with vein  $Cu_{1a}$  strongly arched. Metatibia with 5 thick black apical spurs; basal metatarsus with 1 black spur. Female terminalia as in Fig. 282. Male unknown.

Measurements. See Table 6.

## MATERIAL EXAMINED

2 ♀ (syntypes), Morocco (MM). In addition, there are 2 heads, 5 wings, 2 female genitalia and other oddments on slides labelled 63–69 *Floria maura* type series (MM).

HOST PLANT. Unknown.

PUBLISHED DISTRIBUTION. Morocco (Vondráček, 1951*a, b*).

COMMENTS. This species was described from several females. The male is unknown and this makes it difficult to characterize the species. It appears to differ from other members of the genus in possessing a relatively broad forewing of uniform brownish orange coloration.

**Table 3** Measurements of *Livilla* species. Males and females are given separately and all values are in mm.

		Head width	Antennal length	Forewing length	Female proctiger length	Male proctiger length	Male paramere length	Male aedeagus length
<i>adusta</i>	m	0.63–0.74	1.47–1.66	2.25–2.50	—	0.37–0.39	0.35–0.37	0.26–0.28
	f	0.67–0.74	1.55–1.69	2.28–2.48	0.59–0.63	—	—	—
<i>bimaculata</i>	m	0.70–0.73	1.32–1.37	1.84–1.91	—	0.35–0.38	0.33–0.36	0.28–0.30
	f	0.72–0.76	1.25–1.34	2.15–2.24	0.54–0.59	—	—	—
<i>bivittata</i>	m	0.82–0.83	1.63–1.67	1.91–1.95	—	0.40–0.41	0.31–0.33	0.31–0.33
	f	0.89–0.91	1.65–1.68	2.48–2.50	0.82–0.84	—	—	—
<i>blandula</i>	m	0.51–0.67	1.14–1.32	1.70–2.01	—	0.29–0.34	0.22–0.26	0.19–0.23
	f	0.59–0.72	1.22–1.40	1.70–2.30	0.56–0.62	—	—	—
<i>burckhardtii</i>	m	0.62–0.63	1.14–1.16	1.86–1.90	—	0.32	0.29	0.29
	f	0.64–0.65	1.13–1.16	2.18–2.20	—	—	—	—
<i>cataloniensis</i>	m	0.61–0.68	1.18–1.34	1.69–2.04	—	0.30–0.34	0.25–0.29	0.24–0.26
	f	0.64–0.73	1.19–1.36	1.96–2.33	0.67–0.74	—	—	—
<i>cognata</i>	m	0.80	1.63	2.10	—	0.38	0.35	0.31
	f	0.83	1.76	2.46	0.93	—	—	—
<i>genistae</i>	m	0.72	1.21	1.99	—	0.40	0.42	0.36
	f	0.74–0.76	1.22–1.24	2.16–2.33	0.87–0.93	—	—	—
<i>hodkinsoni</i>	m	0.64–0.69	1.42–1.54	1.90–2.00	—	0.32–0.33	0.32–0.33	0.28–0.29
	f	0.69–0.74	1.52–1.68	2.26–2.38	0.71–0.79	—	—	—
<i>horvathi</i>	m	0.69–0.79	1.80–2.04	2.51–2.73	—	0.40–0.47	0.29–0.35	0.28–0.29
	f	0.71–0.83	1.77–2.04	2.68–3.06	0.75–0.89	—	—	—
<i>klapperichi</i>	m	0.45	—	1.50	—	0.24	0.23	0.20
	f	0.49	—	1.86	0.60	—	—	—
<i>lautereri</i>	m	—	—	1.91	—	0.28	0.29	0.25
	f	0.69	1.63	2.12	0.71	—	—	—
<i>lusitanica</i>	m	0.62–0.65	1.17	0.67–0.85	—	0.29–0.32	0.24–0.26	0.17–0.21
	f	0.64–0.67	1.09–1.24	1.84–1.97	0.53–0.55	—	—	—
<i>maculipennis</i>	m	0.57–0.68	1.25–1.40	1.84–2.13	—	0.32–0.34	0.27–0.31	0.22–0.23
	f	0.63–0.68	1.16–1.38	2.03–2.24	0.54–0.59	—	—	—
<i>magna</i>	m	0.89–0.98	2.33–2.56	3.09–3.35	—	0.44–0.50	0.44–0.47	0.38–0.40
	f	0.99–1.02	2.48–2.67	3.60–3.77	1.04–1.08	—	—	—
<i>maura</i>	m	unknown			male unknown			
	f	0.58–0.65	1.23	1.81–2.27	0.55–0.58	—	—	—
<i>nervosa</i>	m	0.74–0.81	1.88–2.06	2.39–2.72	—	0.45–0.49	0.39–0.41	0.35–0.39
	f	0.73–0.86	1.80–2.18	2.60–3.15	1.09–1.15	—	—	—
<i>nigralineata</i>	m	0.74	1.76	2.33	—	0.38	0.31	0.30
	f	0.81	1.97	2.71	0.86	—	—	—
<i>poggii</i>	m	0.54–0.59	1.06–1.41	1.33–1.57	—	0.27–0.29	0.26–0.27	0.19–0.20
	f	0.58–0.63	1.06–1.19	1.76–1.94	0.58–0.59	—	—	—
<i>pseudoretamae</i>	m	0.65–0.66	1.38–1.40	1.91–1.99	—	0.31–0.36	0.24–0.25	0.22–0.23
	f	0.71–0.73	1.40–1.42	2.18–2.29	0.60–0.61	—	—	—
<i>pyrenaea</i>	m	0.62–0.78	1.50–1.72	2.02–2.49	—	0.37–0.41	0.26–0.31	0.25–0.29
	f	0.71–0.85	1.54–1.82	2.33–2.85	0.76–0.83	—	—	—



Table 3—cont.

	Head width	Antennal length	Forewing length	Female proctiger length	Male proctiger length	Male paramere length	Male aedeagus length
<i>radiata</i>	m 0.73–0.82	1.59–1.78	2.70–2.80	—	0.40–0.41	0.35–0.37	0.30
	f 0.78–0.84	1.82–1.92	2.60–2.70	0.85	—	—	—
<i>retamae</i>	m 0.84–1.00	2.19–2.75	2.81–3.18	—	0.46–0.53	0.43–0.47	0.37–0.40
	f 0.95–1.09	2.21–2.75	2.96–3.51	1.00–1.08	—	—	—
<i>siciliensis</i>	m 0.74–0.81	1.72–1.78	2.35–2.50	—	0.37–0.40	0.37–0.39	0.31–0.32
	f 0.80–0.85	1.86–1.88	2.69–2.79	0.83–0.87	—	—	—
<i>spartiisuga</i>	m 0.73–0.75	1.81–1.83	2.43–2.44	—	0.36–0.38	0.31–0.33	0.33–0.35
	f 0.81–0.82	1.94–1.96	2.80–2.86	0.94	—	—	—
<i>spectabilis</i>	m 0.94–1.00	2.80–3.06	3.42–3.52	—	0.51–0.54	0.41–0.44	0.35–0.37
	f 1.00–1.09	3.29–3.52	3.83–4.14	0.90–0.92	—	—	—
<i>syriaca</i>	m 0.67–0.70	1.67–1.88	1.95–1.97	—	0.35–0.42	0.30–0.34	0.24–0.27
	f 0.65–0.78	1.89–1.90	2.17–2.30	0.67–0.69	—	—	—
<i>ulicis</i>	m 0.70–0.75	1.37–1.50	1.69–1.81	—	0.36–0.37	0.35–0.36	0.28–0.29
	f 0.74–0.79	1.38–1.60	1.84–2.10	0.78–0.85	—	—	—
<i>variegata</i>	m 0.67–0.78	1.78–2.23	2.76–3.06	—	0.40–0.44	0.30–0.34	0.26–0.29
	f 0.71–0.87	1.74–2.25	2.82–3.59	0.82–0.84	—	—	—
<i>vicina</i>	m 0.82–0.83	1.41–1.50	2.12–2.20	—	0.36–0.45	0.38–0.44	0.33–0.35
	f 0.86–0.87	1.39–1.42	2.37–2.39	0.77–0.83	—	—	—
<i>vittipennella</i>	m 0.71–0.76	1.74–1.81	2.35–2.58	—	0.37–0.42	0.37–0.40	0.30–0.33
	f 0.67–0.75	1.48–1.79	2.42–2.66	0.80–0.81	—	—	—

**ARYTAINILLA** Loginova

*Spartina* Heslop-Harrison, 1951: 443; 1961a: 417. Type-species: *Psylla spartii* Guérin, by monotypy. [Homonym of *Spartina* Harris & Burrows, 1891.]

*Lindbergia* Heslop-Harrison, 1951: fig. 2, a, b. Nomen nudum [no included species] (*nec Lindbergia* Riedel, 1958).

*Arytainilla* Ramirez Gomez, 1956: 76. Nomen nudum [type-species not designated].

*Alloeoneura* (*Hispaniola*) Ramirez Gomez, 1956: 91, partim. Nomen nudum [type-species not designated].

*Arytainilla* Loginova, 1972a: 17. Type-species: *Psylla delarbrei* Puton, 1873, designated by Loginova, 1972a: 17.

COMMENTS. All described species of *Arytainilla* occur in the west Mediterranean area and the Macaronesian Islands (Table 4). This is an heterogeneous genus and is almost certainly not a monophyletic group. The type-species, *A. delarbrei*, is exceptional in having 8-segmented antennae, long genal cones, an oval forewing with a short pterostigma and unusual male parameres. Most other congeners have 10-segmented antennae, short genal cones, an oblong-oval forewing and simple parameres. *Arytainilla* species are well illustrated by Šulc (1907a; 1910a, b) and Loginova (1972a; 1976b) and there is little point in repeating their descriptions. Further collecting is required to establish relationships between the species and we have confined ourselves to recognising species-groups where possible (Table 4). The *spartiophila*-group is separated from the rest of *Arytainilla* by the characteristic upturned and pointed apex of the female proctiger. The *dividens*-group comprises species that have oblong-oval forewings, short genal cones, moderate to long female terminalia of normal form and male parameres of various shape but most usually slender and with a bulge or projection on the anterior margin. The *proboscidea*-subgroup is defined by the elongate rostral segments and the spotted patterning along the forewing veins. Members of the *dividens*-subgroup have parameres with a large bulge on the anterior margin, whereas those in the *prognata*-subgroup have a smaller ill-defined bulge. The *equitans*-subgroup consists of species similar to those above but with parameres that lack the anterior bulge.

The remaining species tend to have unique characters that set them apart from the rest of the genus. *A. delarbrei* has already been mentioned; it does, however, have a tendency to the same form of female terminalia as that of the *spartiophila*-group. *A. cytisi* has a truncate female ventral valve and a massive ovipositor. *A. umbonata* has a more elongate, parallel-sided forewing and a distinct bulge on the ventral valve of the female terminalia. The female of *A. egena* has long genal cones and short terminalia that are of





## Discussion

The legume-feeding psyllid fauna of the west Palaearctic appears to comprise a number of evolutionary lines that are identified and diagnosed in this paper as separate monophyletic genera or species-groups within the Acizziinae and Arytaininae. *Arytaina* is defined by characters that include the broad form of the male paramere, the aedeagus with a strongly hooked apex and the lack of a pterostigma and costal break in the forewing. *Livilla* is defined by the narrow elongate paramere and the long bulbous or weakly hooked apex of the aedeagus. *Cyamophila* possesses a paramere that resembles that of *Arytaina* but the propleurites/pronotum structure is more advanced and the costal break and pterostigma are well-developed in the forewing. We have suggested that *Arytainilla* is heterogeneous and probably comprises a number of distinct evolutionary lines. *Acizzia* is separated from the other genera, into the subfamily Acizziinae, by the presence of lateral lobes on the male proctiger. The extent of homoplasy in several of the other characters examined makes it difficult to suggest clear relationships between genera. Thus we have concluded that *Arytaina*, *Livilla*, *Cyamophila* and *Arytainilla*, together with the monotypic central Asian genus *Astragalita*, should be retained, for the present, in the subfamily Arytaininae. We recognise, however, that there are no good autapomorphies that define the subfamily and separate it from the Psyllinae. It remains, nevertheless, a convenient and widely recognised grouping. The Acizziinae is a distinct evolutionary line warranting subfamily status.

*Arytaina*, *Livilla* and some groups within *Arytainilla* are most diverse in the Mediterranean Basin and are associated with papilionoid legumes of the tribe Genisteae, which itself has a primarily Mediterranean distribution. By contrast, most *Cyamophila* species occur in the arid regions of central Asia and are associated with other tribes of papilionoid legumes, particularly Galegeae, Trifoleae, Loteae and Sophoreae. The genus is not known from Africa and the one west European species, *C. prohaskai*, represents the western limit of this genus. *Acizzia* species are widespread throughout Africa, Arabia, India, South East Asia and Australasia. They are primarily associated with the equally widely distributed mimosoid legume genera *Acacia* and *Albizia*. *Acizzia* appears to be an old genus with a very wide distribution that reaches its natural northern and western limits in the area under consideration.

Legume systematics, particularly of the tribe Genisteae, have been the subject of much debate (Bisby, 1981). It is of interest to see if the pattern of host plant relationships for the different psyllid groups can contribute to an understanding of legume classification and vice versa. In a recent classification of the legumes Bisby (1981) split the Genisteae into two subtribes, the Lupininae and the Genistinae. He subdivided the latter into three main groups of genera (Table 5). His *Cytisus*-group contains the arytainine host genera *Cytisus*, *Laburnum* and *Chamaecytisus*; the *Genista*-group contains *Genista*, *Ulex* and *Retama*, while the outliers include *Adenocarpus*, *Calicotome* and *Spartium*.

Table 5 shows the distribution of psyllids across their host plants in the Genisteae. Each record indicates a known association between a psyllid species and a species of host plant. Species of *Livilla* are concentrated on hosts within Bisby's *Genista*-group, particularly the large genus *Genista* itself, but also on *Ulex* and *Retama*. However, some species also feed on genera in Bisby's other two groups of Genistinae. Of the two psyllid species known to feed on the outlier group, *spectabilis* is monophagous on *Spartium junceum*, whereas *pyrenaea* is recorded from *Calicotome* and *Genista*. Among the three species feeding on the *Cytisus*-group (*radiata*, *cognata* and *variegata*) *cognata* also has a known host in the *Genista*-group, while *radiata* is oligophagous on several species of *Chamaecytisus*. The core species of *Livilla*, the *spartiisuga*- and *horvathi*-groups, tend to occur on *Genista*. The morphologically isolated species, such as *variegata* and *spectabilis*, tend to occur on the more taxonomically isolated groups of host plants.

By contrast with *Livilla*, the hosts of *Arytaina* and *Arytainilla* are more evenly spread across the Genisteae. Within the *Cytisus*-group, *Arytaina genistae* and *A. maculata* occur on *Cytisus* and *Chamaecytisus*, whereas *Arytainilla* species such as *gredi*, *spartiophila*, *spartiicola*, *devia*, *dividens* and *nubivaga* are concentrated on *Cytisus*. The *Genista*-group supports just four species, *Arytaina genistae* (record requires confirmation), *A. torifrons* and *Arytainilla delarbrei*

**Table 5** Host plant relationships of *Livilla*, *Arytaina* and *Arytainilla* species across the Genisteae. The number of species in each genus (N) is taken from Bisby (1981) except for *Argyrolobium* which is taken from *Flora Europaea* (Tutin *et al.*, 1964).

	N	<i>Livilla</i>	Number of host records <i>Arytaina</i>	<i>Arytainilla</i>	Total
Subtribe Lupininae		0	0	0	0
Subtribe Genistinae					
Cytisus-group					
<i>Laburnum</i>	2	2	0	0	2
<i>Hesperolaburnum</i>	1	0	0	0	0
<i>Podocytisus</i>	1	0	0	0	0
<i>Cytisophyllum</i>	1	0	0	0	0
<i>Petteria</i>	1	0	0	0	0
<i>Argyrocytisus</i>	1	0	0	0	0
<i>Cytisus</i>	33	2	1	6	9
<i>Chaemaecytisus</i>	30	6	5	2	13
Genista-group					
<i>Retama</i>	4	3	0	1	4
<i>Genista</i>	87	18	2	1	21
<i>Echinospartum</i>	3	0	0	0	0
<i>Stauracanthus</i>	2	0	0	0	0
<i>Ulex</i>	20	2	0	0	2
Outlier group					
<i>Argyrolobium</i>	2	0	0	0	0
<i>Adenocarpus</i>	15	0	2	2	4
<i>Calicotome</i>	2	1	1	1	3
<i>Erinacea</i>	1	0	0	0	0
<i>Spartium</i>	1	1	0	0	1
<i>Gonocytisus</i>	3	0	0	0	0

on *Genista*, and *Arytainilla egena* on *Retama*. The outlier plant group supports *Arytaina putonii* and *Arytainilla cytisi* on *Calicotome*, and *Arytaina adenocarpi* and *Arytainilla devia* on *Adenocarpus*.

Table 5 indicates that the larger the plant genus the more psyllid species that genus is likely to support, with a psyllid feeding record for about every four species of plants. This relationship can be interpreted in two ways. It may indicate a simultaneous diversification of both plants and insects (coevolution), but, more likely, it is the result of an initial plant species radiation with a subsequent radiation of the insects, made successful by their high degree of monophagy (see Benson *et al.*, 1976; Vane-Wright, 1978).

Overall, however, our present level of knowledge of psyllid host plant relationships adds little to an understanding of the classification and evolution of the Genisteae. There is already a high level of incongruence between legume classifications based on morphology and those based on other biological characteristics (Bisby, 1981). The lack of clear specialisations by the different psyllid groups adds further to this incongruity.

## References

- Andrianova, N. S. 1952. New species of leafhopper from Kazakhstan – The *Medicago* leafhopper *Psylla medicaginis* sp. nova (Homoptera; Psylloidea). *Zoologicheskii Zhurnal* **31**: 270–271. [In Russian.]
- Andrianova, N. S. & Klimaszewski, S. M. 1983. A contribution to the knowledge of psyllids (Psylloidea) in southern and south eastern European U.S.S.R. *Acta Biologica, Katowice* **13**: 30–46.
- Arzone, A. & Vidano, C. 1985. Il fitomizo *Psylla uncatoides* su mimosa in Liguria. *Informatore Fitopatologico* **35**: 31–34.
- Aulmann, G. 1912. Beiträge zur Kenntnis der Psylliden Fauna von Neu-Guinea. *Entomologische Rundschau* **29**: 117–118.
- 1913. *Psyllidarum Catalogus*, 92pp. Berlin.
- Baeva, V. G. & Kankina, V. K. 1971. The Psyllids (Homoptera: Psylloidea) of Pamir. *Izvestiya Akademii Nauk Tadzhikskoi SSR* **3**: 80–86. [In Russian.]



- Bagnall, R. S.** 1916. A November week at Grange-over-Sands. IV Homoptera (Typhlocybinae and Psyllidae). *Lancashire and Cheshire Naturalist* **8**: 387–390.
- Bain, C., Labit, B., Mimaud, J. & Tanguy, M.** 1976. Resultats de l' experimentation effectuée en 1975 par la service de la protection des vegetaux. *Phytoma* **28**: 7–13.
- Becker, A.** 1864. Naturhistorische Mittheilungen. *Bulletin de la Société Impériale des Naturalistes de Moscou* **37**: 477–493.
- 1867. Noch einige Mittheilungen über Astrachaner und Sareptaer Pflanzen und Insekten. *Bulletin de la Société Impériale des Naturalistes de Moscou* **40**: 104–115.
- Benson, W. W., Brown, K. S. Jr & Gilbert, L. E.** 1976. Coevolution of plants and herbivores: Passion Flower Butterflies. *Evolution* **29**: 659–680.
- Bisby, F. A.** 1981. The Genisteae, pp 409–425. In Polhill, R. M. & Raven, P. H. (Eds), *Advances in Legume Systematics*. Kew.
- Blote, H. C.** 1926. Overzicht der nederlandse Psylliden-soorten. *Tijdschrift voor Entomologie* **69**: 57–84.
- Bolivar, I. & Chicote, C.** 1879. Enumeracion de los Hemipteros observados en España y Portugal. *Anales de la Sociedad Española de Historia Natural* **8**: 147–186.
- Braza, R. D. & Calilung, V. J.** 1981. Some Philippine psyllids (Psyllidae: Homoptera). *Philippine Entomologist* **4**: 319–360.
- Britten, H.** 1930. Hemiptera-Homoptera, pp 71–75. In Lawson, A. K. (Ed.), *A check list of the fauna of Lancashire and Cheshire*. Arbroath.
- Burckhardt, D.** 1979. *Floria hodkinsoni* n. sp. eine neue Psyllide aus Griechenland (Sternorrhyncha, Psylloidea). *Mitteilungen der Schweizerischen Entomologischen Gesellschaft* **52**: 391–393.
- 1981. Insects of Sauda Arabia. Sternorrhyncha: Suborder Psylloidea. *Fauna of Saudi Arabia* **3**: 213–226.
- 1983. Beiträge zur Systematik und Faunistik der schweizerischen Psylloidea (Sternorrhyncha). *Entomologica Basiliensia* **8**: 43–83.
- 1986. Sternorrhyncha: Suborder Psylloidea of Saudi Arabia (Part 2). *Fauna of Saudi Arabia* **7**: 141–159.
- Burmeister, H.** 1843. *Zoologischer Hand-Atlas zum Schulgebrauch und Selbstunterricht*, 192 pp. Berlin.
- Caldwell, J. S.** 1944. Notes on Mexican and Central American Psyllidae. *Ohio Journal of Science* **44**: 57–64.
- Capener, A. L.** 1970. Southern African Psyllidae (Homoptera). 1. A check list of species recorded from South Africa, with notes on the Pettey collection. *Journal of the Entomological Society of Southern Africa* **33**: 195–200.
- Carpentier, L. & Dubois, M.** 1892. Matériaux pour la Faune des Hémiptères de l'Oise. *Mémoires de la Société Linnéenne du Nord de la France* **8**: 439–440.
- Cerutti, N.** 1939a. Captures intéressantes d'Hémiptères du Valais (3e liste) et description d'espèces nouvelles. *Mitteilungen der Schweizerischen Entomologischen Gesellschaft* **17**: 443–449.
- 1939b. Présentation de quelques Hémiptères du Valais. *Mitteilungen der Schweizerischen Entomologischen Gesellschaft* **17**: 582–583.
- Chicote, C.** 1880. Adiciones al Enumeracion de los Hemipteros observados en España y Portugal. *Anales de la Sociedad Española de Historia Natural* **9**: 202–203.
- Conci, C. & Tamanini, L.** 1984a. *Floria (Floria) poggii* n. sp., from Sardinia, host plant *Genista corsica* (Homoptera, Psylloidea). *Annali del Museo Civico di Storia Naturale di Genova* **85**: 43–49.
- 1984b. Twenty six species of Psylloidea new for Italy. *Atti della Società italiana di scienze naturali e del Museo civile di storia naturale* **125**: 255–270.
- 1986. *Cyamophila prohaskai* from Alto Adige and Trentino, genus and species new for Italy (Homoptera: Psylloidea). *Studi Trentini di Scienze Naturali (Biologica)* **62**: 59–68.
- 1986. *Cyamophila prohaskai* from Alto Adige and Trentino, genus and species new for Italy (Homoptera: Psylloidea). *Studi Trentini di Scienze Naturali (Biologica)* **62**: 59–68.
- Costa, A.** 1863. Nuovi studii sulla entomologia della Calabria Ulteriore. *Atti della R. Accademia della Scienze, Fische e Matematiche. Napoli* **1** (2): 1–80.
- Cotes, E. C.** 1893. *Pyslla isitiis* sp. n. *Indian Museum Notes* **2** (1): 18.
- Crawford, D. L.** 1911. American Psyllidae V. *Pomona College Journal of Entomology* **3**: 628–632.
- 1912a. A note on certain Psyllidae. *Pomona College Journal of Entomology* **4**: 684.
- 1912b. Indian Psyllidae. *Records of the Indian Museum* **7**: 419–435.
- 1914. A monograph of the jumping plant lice or Psyllidae of the New World. *Bulletin of the US National Museum* **85**: 1–182.
- 1917. Philippine and Asiatic Psyllidae. *Philippine Journal of Science* **12**: 163–175.

- 1919. The jumping plant lice of the Palaeotropics and the South Pacific islands. *Philippine Journal of Science* **15**: 139–207.
- 1924. New Indian Psyllidae. *Records of the Indian Museum* **26**: 615–621.
- Curtis, J.** 1835. *British Entomology* **12**. London.
- 1836. *British Entomology* **13**. London.
- Dobreanu, E. & Manolache, C.** 1962. Homoptera: Psylloidea. *Fauna Republicii Populare Romîne Insecta* **8**: 1–376.
- Dominique, J.** 1902. Catalogue des Hémiptères (Het., Hom., Psyllides) de la Loire Inférieure. *Bulletin de la Société des Sciences Naturelles de l'Ouest de la France* **12**: 161–231.
- Douglas, J. W.** 1878. Scandinavian Psyllidae. *Entomologist's Monthly Magazine* **15**: 41–42.
- Dubois, M.** 1898. Supplement au Catalogue des Hémiptères de la Somme. *Mémoires de la Société Linnéenne du Nord de la France* **9**: 239–240.
- Duda, L.** 1892. *Hmyz Polokridly v Cechach Zijici. Catalogus insectorum faunae Bohemicae: Rhynchota*, pp. 37–39. Praha.
- Edwards, J.** 1896. *The Hemiptera-Homoptera of the British Isles. Psyllina*, pp. 224–261. London.
- Emmrich, R.** 1976. Zur Verbreitung von *Arytaina genistae* (Latreille) in der DDR (Homoptera: Psylloidea). *Faunistische Abhandlungen Staatliches Museum für Tierkunde in Dresden* **6**: 163–164.
- 1978. Zur Kenntnis der Blattflohfauna der Sächsischen Schweiz (Homoptera: Psylloidea). *Entomologische Abhandlungen, Staatliches Museum für Tierkunde in Dresden* **42**: 275–293.
- Enderlein, G.** 1921. Psyllidologica VI. *Zoologischer Anzeiger* **52**: 115–123.
- 1926. Psyllidologica VIII. *Entomologische Mitteilungen* **15**: 397–401.
- Ferrari, P. M.** 1888. Psyllide raccolte in Liguria. *Annali del Museo Civico di Storia Naturale Giacomo Doria* **6**: 74–77.
- Ferris, G. F. & Klyver, F. D.** 1932. Report upon a collection of Chermidae (Homoptera) from New Zealand. *Transactions of the New Zealand Institute* **63**: 34–61.
- Flor, G.** 1861. Zur Kenntniss der Rhynchoten. *Bulletin de la Société Impériale des Naturalistes de Moscou* **34**: 331–422.
- Förster, A.** 1848. Uebersicht der Gattungen und Arten in der Familie der Psylloden. *Verhandlungen des naturhistorischen Vereins der preussischen Rheinlande* **5**: 65–98.
- Franz, H.** 1943. Die Landtierwelt der Mittleren Hoen Tauern. Familie Psyllidae. *Denkschriften der Akademie der Wissenschaften, Wien* **107**: 381–383.
- Froggatt, W. W.** 1901. Australian Psyllidae II. *Proceedings of the Linnean Society of New South Wales* **26**: 242–298.
- Frauenfeld, G.** 1869. Zwei neue Auswuchse, ersterer aus Shanghai in China, letzterer aus Ercsi an der Donau. *Verhandlungen der zoologisch-botanischen Gesellschaft in Wien* **19**: 934–936.
- Fuente, J. M.** 1920. Hemipteros de la provincia de Ciudad Real no citados como la peninsula iberica en el catalogo de Oshanin de 1912. *Boletín de la Sociedad Española de Historia Natural, Madrid* **10**: 321.
- Gagne, W.** 1971. Notes and exhibitions. *Psylla uncatoides. Proceedings of the Hawaiian entomological Society* **21**: 25.
- Gegechkori, A. M.** 1968. Materials for the study of the Psyllidae (Homoptera: Psylloidea) – narrowly specialised phytophagia. *Soobshcheniya Akademii Nauk Gruzinskoi SSR* **52**: 509–514. [In Russian.]
- 1969a. Some ecological peculiarities of psyllids (Homoptera: Psylloidea) inhabiting the droughty regions of Georgia. *Soobshcheniya Akademii Nauk Gruzinskoi SSR* **54**: 221–224. [In Russian.]
- 1969b. On the ecology and faunistics of the Psylloidea of Transcaucasia. *Soobshcheniya Akademii Nauk Gruzinskoi SSR* **54**: 721–724. [In Russian.]
- 1970. Study of the Psyllidae of Western Georgia. *Soobshcheniya Akademii Nauk Gruzinskoi SSR* **59**: 713–716. [In Russian.]
- 1976. The psyllids (Homoptera: Psylloidea) of the Caucasus. *Vestnik Gosudarstvennogo Muzeia Gruzii* **9a**: 54–95. [In Russian.]
- 1978. Psyllids (Homoptera, Psylloidea) of the Middle Currency of the River Arax (Transcaucasia), 75 pp. Tbilisi. [In Russian.]
- 1981. On the vertical distribution patterns of the psyllids of the Caucasus. *Vestnik Gosudarstvennogo Muzeia Gruzii* **31a**: 116–123. [In Russian.]
- 1983. Food plant specialization of the psyllid fauna of the Caucasus. *Vestnik Gosudarstvennogo Muzeia Gruzii* **32a**: 102–212. [In Russian.]
- 1984. Psyllids (Homoptera, Psylloidea) of the Caucasus, 296 pp. Tbilisi. [In Russian.]
- Gegechkori, A. M. & Djibladze, D. S.** 1976. *The psyllids of Colchida*, 110 pp. Tbilisi. [In Russian.]
- Germar, E. F.** 1839. Vermischte Bemerkungen und Correspondenznachrichten. *Zeitschrift für Entomologie (Germar)* **1**: 365.



- Glowacka, E.** 1979. Koliszki (Psylloidea) Beskidu Śląskiego i Beskidu Żywieckiego. *Acta Biologica, Katowice* 7: 45–52.
- Guérin-Méneville, F. E.** 1843. *Iconographie du règne animal de G. Cuvier*. Insectes. 576 pp, 104 pls. Paris.
- Halbert, J. N.** 1934. A list of the Irish Hemiptera (Heteroptera and Cicadina). *Proceedings of the Royal Irish Academy (B)* 42: 211–318.
- Halperin, J., Hodkinson, I. D., Russell, L. M. & Berlinger, M. J.** 1982. A contribution to the knowledge of the psyllids of Israel (Homoptera: Psylloidea). *Israel Journal of Entomology* 16: 27–44.
- Hartig, T.** 1841. Versuch einter Eintheilung der Pflanzenlaus (Phytophthires Burm.) nach der Flugelbildung. *Zeitschrift für Entomologie (Germar)* 3: 359–376.
- Haupt, H.** 1935. Gleichflüger Homoptera, Psylloidea. *Die Tierwelt Mitteleuropas* 4: 221–252.
- Heslop-Harrison, G.** 1936a. Psyllidae in certain Highland countries. *Scottish Naturalist* 220: 120–122.
- 1936b. The Psyllidae or jumping plant-lice of Northumberland and Durham. *Transactions of the Northern Naturalist's Union* 1: 217–228.
- 1936c. A contribution to our knowledge of the Psyllidae of the Hebrides. *Entomologist's Monthly Magazine* 72: 48–51.
- 1937. Observations on the biology of British Psyllidae. *Entomologist* 70: 1–4.
- 1949. A new Indo-Malayan genus and species of the family Psyllidae (Hemiptera: Homoptera). *Entomologist's Monthly Magazine* 85: 161–164.
- 1951. The Aryanini of the subfamily Psyllinae Hemiptera-Homoptera, family Psyllidae 1. *Annals and Magazine of Natural History* (12) 4: 417–462.
- 1961a. The Aryanini of the subfamily Psyllinae Hemiptera-Homoptera, family Psyllidae 2. *Annals and Magazine of Natural History* (13) 3: 417–439.
- 1961b. Hemiptera (Homoptera): Psyllidae. *South African Animal Life* 8: 487–532.
- Heslop-Harrison, J. W.** 1915. The Psyllidae of the Cleveland. *Naturalist, Hull* 1915: 400–401.
- Hodkinson, I. D.** 1973. A note on the taxonomy of the Psyllidae of British Columbia. *Journal of the Entomological Society of British Columbia* 70: 68–69.
- 1976. An annotated list of psyllids (Hom., Psylloidea) from N.W. England. *Entomologist's Gazette* 27: 123–126.
- 1978. The jumping plant-lice (Insecta: Homoptera: Psylloidea) of Jersey. *Annual Bulletin of the Société Jersiaise* 26: 202–205.
- 1980. Present day distribution patterns of the Holarctic Psylloidea with particular reference to the origins of the Nearctic fauna. *Journal of Biogeography* 7: 127–146.
- 1983. The Psyllids (Homoptera: Psylloidea) of the Austro-Oriental, Pacific and Hawaiian zoogeographical realms: an annotated check list. *Journal of Natural History* 17: 341–377.
- Hodkinson, I. D. & Hollis, D.** 1980. *Floria variegata* Löw (Homoptera: Psylloidea) in Britain. *Entomologist's Gazette* 31: 171–172.
- 1981. The psyllids (Homoptera: Psylloidea) of Mallorca. *Entomologica Scandinavica* 12: 65–77.
- Hodkinson, I. D. & White, I. M.** 1979a. New psyllids from France with redescriptions of the type species of *Floria* Löw and *Amblyrhina* Löw (Homoptera: Psylloidea). *Entomologica Scandinavica* 10: 55–63.
- 1979b. Homoptera, Psylloidea. *Handbook for the Identification of British Insects* 2 (5a): 1–98.
- 1981. The Neotropical Psylloidea (Homoptera: Insecta): an annotated check list. *Journal of Natural History* 15: 491–523.
- Hollis, D.** 1978. *Floria variegata* Löw (Homoptera: Psylloidea) on *Laburnum* in Britain. *Plant Pathology* 27: 149.
- Horvath, G.** 1886. A magyarországi Psyllidarkrol. *Mathematikai es Termesztudományi Közlemenyek* 21: 291–320.
- 1904. Insecta Heptopotamica. *Annales Historica-Naturales Musei Nationalis Hungarici* 2: 574–590.
- 1905. Descripciones de algunos Hemipteros nuevos del centro de España. *Boletín de la Sociedad Española de Historia Natural, Madrid* 5: 272–277.
- 1918a. Psyllidae. *Fauna Regni Hungariae*. 8: 57–59.
- 1918b. Ad cognitioneum faunae Hemipterorum Balcanicae. *Annales Historico-Naturales Musei Nationalis Hungarici* 16: 321–340.
- Hueber, T.** 1904. Übersichtstabelle unserer Halbflüger (Hemiptera) unter besonderer Berücksichtigung der Zikaden und Psylliden. *Jahresheft des Vereins für Vaterländische Naturkunde in Württemberg* 60: 253–277.
- Ing, B.** 1967. Jumping Plant-lice. *Report of the Scottish Field Studies Association* 1966: 11–13.
- 1971. The jumping plant-lice (Psyllidae) of Hertfordshire. *Transactions of the Hertfordshire Natural History and Field Club* 27: 110–116.
- 1974. Psyllids (Homoptera) from North Wales. *Entomologist's Monthly Magazine* 110: 89–98.



- Jacobsen, O.** 1919. Fortegnelse over de hidtil kendte danske Psyllider. *Entomologiske Meddelelser* **12**: 355–360.
- Jensen, D. D.** 1957a. The albizia psyllid *Psylla uncatoides* (Ferris & Klyver) in California. *Pan Pacific Entomologist* **33**: 29–30.
- 1957b. Four new species of *Arytaina* from California (Homoptera: Psyllidae). *Journal of the Kansas Entomological Society* **30**: 89–98.
- Joakimov, D.** 1909. The Hemipteran Fauna of Bulgaria. *Sbornik za Narodni Umotvoreniya Nauka i Knizhnina* **25**: 1–34. [In Bulgarian.]
- Kieffer, J. J.** 1905. Étude sur de nouveaux insectes et Phytoptides Gallicoles du Bengale. *Annales de la Société Scientifique de Bruxelles* **29**: 143–200.
- Kitching, R. L.** 1971. The Psyllidae of British Columbia with a key to species. *Journal of the Entomological Society of British Columbia* **68**: 36–43.
- Klimaszewski, S. M.** 1961. Kolisky (Homoptera: Psyllidae) Doliny Nidy. *Fragmenta Faunistica* **9**: 75–85.
- 1963. Polnische Arten der Gattung *Psylla* Geoff. (Homoptera: Psyllidae). *Annales Zoologici, Warszawa* **20**: 363–455.
- 1964. Psyllidologische Notizen VII–XI (Homoptera). *Annales Zoologici, Warszawa* **22**: 57–67.
- 1965. Psyllidologische Notizen XII–XIV (Homoptera). *Annales Zoologici, Warszawa* **23**: 195–209.
- 1967. Koliszki Psylloidea. *Katalog Fauny Polski* **21** (2): 1–51.
- 1968a. Results of zoological research of Dr. Z. Kaszab in Mongolia 146. Homoptera, Psyllidae. *Reichenbachia* **11**: 221–233.
- 1968b. Psyllidologische Notizen XV–XVI. *Polski Pismo Entomologiczne* **38**: 781–790.
- 1969a. Pluskwiaki rownoskrzydte – Homoptera, Zeszyt 3, Koliszki-Psylloidea. *Klucze Oznaczenia Owadów Polski* **17**: 1–89.
- 1969b. Psylloidea III. Ergebnisse der zoologischen Forschungen von Dr. Kaszab in der Mongolei (Homoptera). *Annales Universitatis Mariae Curie-Sklodowska* **24**: 215–226.
- 1970. Psyllidologische Notizen XVIII–XX (Homoptera). *Annales Zoologici, Warszawa* **27**: 417–428.
- 1971. Koliszki (Homoptera: Psylloidea) Bieszczadow. *Fragmenta Faunistica* **17**: 161–178.
- 1973. The jumping plant-lice or psyllids (Homoptera: Psylloidea) of the Palaearctic. An annotated check-list. *Annales Zoologici, Warszawa* **30**: 155–286.
- 1975. Psylloidea. Koliszki (Insecta: Homoptera). *Fauna Polski* **3**: 1–295.
- Klimaszewski, S. M. & Lodos, N.** 1977. New information about jumping plant lice (Homoptera: Psylloidea) of Turkey. *Ege Üniversitesi Ziraat Fakültesi Dergisi* **14** (2): 1–9.
- 1979. Further data about the jumping plant lice of Turkey (Homoptera: Psylloidea). *Türkiye Bitki Koruma Dergisi* **3**: 3–16.
- Koehler, C. S., Kattoulas, M. E. & Franklin, G. W.** 1966. Biology of *Psylla uncatoides*. *Journal of Economic Entomology* **59**: 1097–1100.
- Kuwayama, S. & Miyatake, Y.** 1971. Psyllidae from Shansi, North China (Homoptera). *Mushi* **45**: 51–58.
- Laing, F.** 1930. Some records of Indo-Malayan Psyllidae. *Indian Forest Records* **14**: 166–175.
- Lambertie, M.** 1910. Contribution à la faune des Hémiptères, Hétéroptères, Cicadines et Psyllides du Sud-Ouest de la France, 2nd edn. *Miscellanea Entomologica* **18**: 1–103.
- Latreille, P. A.** 1804. *Histoire naturelle, générale et particulière des Crustacés et des Insectes* **12**: 424 pp. Paris.
- Lauterer, P.** 1963. A contribution to the knowledge of the psyllid fauna of Czechoslovakia. *Časopis Moravského Musea v Brně* **48**: 145–156. [In Czechoslovakian.]
- 1965. A contribution to the knowledge of the psyllid fauna of Czechoslovakia II. *Časopis Moravského Musea v Brně* **50**: 171–190.
- 1971. Contribution to the knowledge of psyllids from the collections of the Zoological Museum of the Humboldt-University in Berlin. *Deutsche Entomologische Zeitschrift* **18**: 195–198.
- 1976. Psyllids of wetland nature reserves of the German Democratic Republic, with notes on their biology, taxonomy and zoogeography (Homoptera, Psylloidea). *Faunistische Abhandlungen, Staatliches Museum für Tierkunde in Dresden* **6**: 111–122.
- 1977. Enumeratio insectorum Bohemoslovakiae. *Acta Faunistica entomologica Musei Nationalis Pragae* **15**. (Suppl) **4**: 97–100.
- Leeper, J. R. & Beardsley, J. W.** 1973. The bioecology of *Psylla uncatoides* in the Hawaii Volcanoes National Park and the *Acacia koaia* sanctuary. *U.S. IPB Island Ecosystems IRP Technical Report* **23**: 1–13.
- 1976. The biological control of *Psylla uncatoides* (Ferris & Klyver) (Homoptera: Psyllidae) on Hawaii. *Proceedings of the Hawaiian Entomological Society* **22**: 307–321.
- Lethierry, L. F.** 1869. Catalogue des Hémiptères du Department du Nord. *Mémoires de la Société des Sciences, de l'Agriculture et de Arts à Lille* **6**: 365.

- 1874. *Catalogue des Hémiptères du Department du Nord*. 2nd ed, 108 pp. Lille (Danel).
- Loginova, M. M.** 1964. Suborder Psyllinea – Jumping Plant Lice. In Bei-Bienko, G. Ya. (Ed.). Keys to the insects of the European U.S.S.R. 1. *Opredeliteli po Faune SSR* **84**: 437–482. [In Russian. English Translation: Israel Programme for Scientific Translation, Jerusalem, 1967.]
- 1966. On the fauna and biology of the psyllids (Homoptera: Psylloidea) of the Moldavian SSR. *Trudy Moldavskogo Nauchno-Issledovatel'skogo Instituta Sadovodstva Vinogradarstva i Vinodeliya* (Entomology) **13**: 131–148. [In Russian.]
- 1967. Ergebnisse der zoologischen Nubien-Expedition. Homoptera-Psilloidea. *Annalen des Naturhistorischen Museums in Wien* **70**: 401–409. [In Russian.]
- 1968. New data on the fauna and biology of the Caucasian Psylloidea (Psylloidea). *Trudy Vsesoyuznogo Entomologicheskogo Obshchestva Akedemiya Nauk SSR* **52**: 275–328. [In Russian.]
- 1971. On the systematics of the Palaearctic Psylloidea (Homoptera, Homoptera). *Entomologicheskoe Obozrenie* **50**: 628–631. [In Russian. English translation, *Entomological Review, Washington* **50**: 355–356.]
- 1972a. On the fauna of Psylloidea from Morocco (Homoptera). *Commentationes Biologicae* **47**: 1–37.
- 1972b. Section Psylloidea – psyllids, pp. 139–146. In: *Insects and Ticks harmful to Agriculture* **1**. Insects with incomplete metamorphosis. Leningrad. [In Russian.]
- 1976a. Classification of subfamily Arytaininae Crawford. (Homoptera: Psyllidae) 1. A review of the genera of the tribe Arytainini. *Entomologicheskoe Obozrenie* **55**: 589–601. [In Russian. English translation, *Entomological Review, Washington* **55** (3): 61–68.]
- 1976b. Psyllids (Psylloidea, Homoptera) of the Canary Islands and Madeira. *Commentationes Biologicae* **81**: 1–37.
- 1977. A classification of the subfamily Arytaininae Crawford. (Homoptera, Psyllidae). 2. A review of the genera of the tribe Cyamophilini. *Entomologicheskoe Obozrenie* **56**: 577–587. [In Russian. English translation, *Entomological Review, Washington* **56** (3): 64–71.]
- 1978. New species of psyllid (Homoptera: Psylloidea). *Trudy Zoologicheskogo Instituta Akedemiya Nauk SSR, Leningrad* **61**: 30–123. [In Russian.]
- 1981. Structure and morpho-ecological types of the psyllid nymphs (Homoptera: Psylloidea). *Trudy Zoologicheskogo Instituta Akedemiya Nauk SSR, Leningrad* **105**: 20–52. [In Russian.]
- Loginova, M. M. & Baeva, V. G.** 1972. Review of psyllids of the genus *Psylla* Geoffr. (Homoptera: Psylloidea) connected with *Glycyrrhiza* species. *Trudy Vsesoyuznogo Entomologicheskogo Obshchestva Akedemiya Nauk SSR* **55**: 4–13. [In Russian.]
- Löw, F.** 1862. Beiträge zur Kenntniss der Rhynchoten. *Verhandlungen der zoologisch-botanischen Gesellschaft in Wien* **12**: 105–111.
- 1877. Beiträge zur Kenntnis der Psylloden. *Verhandlungen der zoologisch-botanischen Gesellschaft in Wien* **27**: 123–154.
- 1879. Zur Systematik der Psylloden. *Verhandlungen der zoologisch-botanischen Gesellschaft in Wien* **28**: 585–610.
- 1880. Mitteilungen über Psylloden. *Verhandlungen der zoologisch-botanischen Gesellschaft in Wien* **29**: 549–598.
- 1881. Turkenstanische Psylloden. *Verhandlungen der zoologisch-botanischen Gesellschaft in Wien* **30**: 251–266.
- 1882a. Beiträge zur Biologie und Synonymie der Psylloden. *Verhandlungen der zoologisch-botanischen Gesellschaft in Wien* **31**: 157–170.
- 1882b. Beschreibung von zehn neuen Psylloden-Arten. *Verhandlungen der zoologisch-botanischen Gesellschaft in Wien* **31**: 255–268.
- 1883. Revision der paläarktischen Psylloden in Hinsicht auf Systematik und Synonymie. *Verhandlungen der zoologisch-botanischen Gesellschaft in Wien* **32**: 227–254.
- 1885. Beiträge zur Kenntnis der Jugendstadien der Psylliden. *Verhandlungen der zoologisch-botanischen Gesellschaft in Wien* **34**: 143–152.
- 1886. Neue Beiträge zur Kenntnis der Psylliden. *Verhandlungen zoologisch-botanischen Gesellschaft in Wien* **36**: 149–170.
- 1888a. Übersicht der Psylliden von Österreich-Ungarn mit Einschluss von Bosnien und der Herzegovina, nebst Beschreibung neuer Arten. *Verhandlungen der zoologisch-botanischen Gesellschaft in Wien* **38**: 5–40.
- 1888b. Description d'une espèce nouvelle d'*Amblyrhina* et tableau synoptique des espèces de ce genre de Psyllidae. *Revue d'Entomologie, Caen* **7**: 381–382.
- Madubunyi, L. C. & Koehler, C. S.** 1974. Development, survival and capacity for increase of the Albizzia psyllid at various constant temperatures. *Environmental Entomology* **3**: 1013–1016.

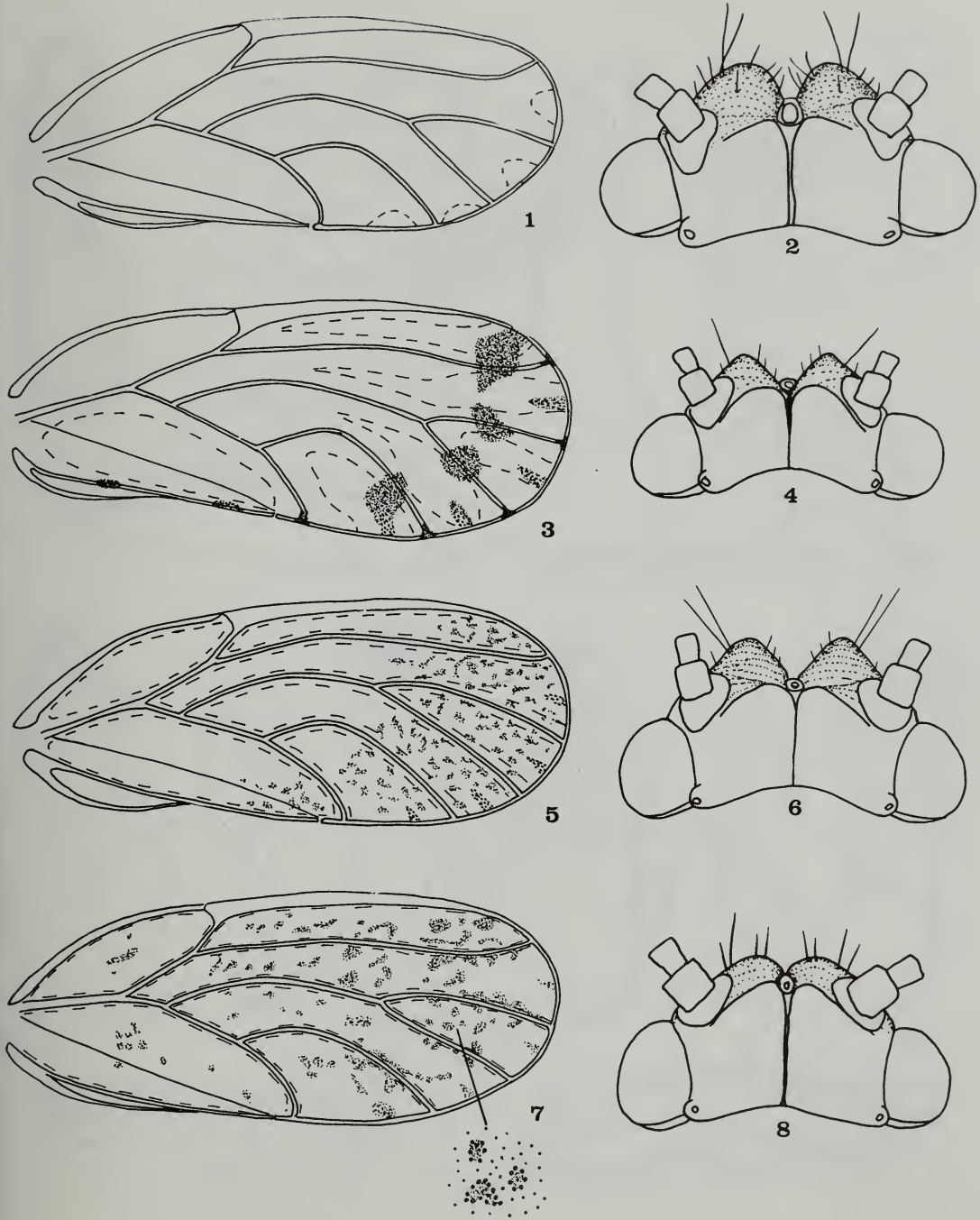


- Maskell, W. M. 1894. On a new species of *Psylla*. *Entomologist's Monthly Magazine* **30**: 171–173.
- Mathur, R. N. 1973. Descriptions and records of some Indian Psyllidae (Homoptera). *Indian Forest Records*, New Series (Entomology) **11**: 59–87.
- 1975. *Psyllidae of the Indian Subcontinent*. 429 pp. New Delhi.
- Meyer-Dür, R. 1871. Die Psylloden. Skizzen zur Einführung in das Studium dieser Hemipterenfamilie. *Mitteilungen der Schweizerischen Entomologischen Gesellschaft* **3**: 277–406.
- Mink, W. 1859. Kleinere Mitteilungen. *Stettiner Entomologische Zeitung* **20**: 430.
- Morgan, D. F. 1984. *Psylloidea of South Australia*. Handbook of the Flora and Fauna of South Australia. 136 pp. South Australia.
- Munro, J. A. 1965. Occurrence of *Psylla uncatoides* on *Acacia* and *Albizzia* with notes on control. *Journal of Economic Entomology* **58**: 1171–1172.
- Murray, J. 1936. Hemiptera-Homoptera in Dumfriesshire. *Entomologist's Monthly Magazine* **72**: 138.
- Novak, P. & Wagner, W. 1962. Prilog poznavanju faune Homoptera Dalmacije. *Godisnjak Biolski Institut v Sarajevu* **15**: 31–53.
- Olivier, E. 1904. Faune de l'Allier. Ordre des Hémiptères, sous ordre II Homoptères. *Revue Scientifique du Bourbonnais et du Centre de la France* **17**: 89–96.
- Onucar, A. 1983. Izmir cevresidne, bitkilerde zararli psyllid (Homoptera: Psyllinea) türlerinin taninmaları, Konucları ve taksomileri üzeridne arastirmalar. *T. C. Tarım ver orman bakanligi, Zirai Mücadele ve zirai Karantina genel müdürlüğü, Izmir bolge zirai mücadele arastirma entitüsü müdürlüğü, Arastirma Eserleri Serisi* **44**: 1–122.
- Oshanin, B. 1907. Verzeichnis der Paläarktischen Hemipteren. Band 2 Homoptera part 2. *Ezhegodnik Zoologheskogo Muzeya* **12**: 338–381.
- 1912. *Katalog der Paläarktischen Hemipteren (Heteroptera, Homoptera-Auchenorhyncha und Psylloidea)*, xvi + 187 pp. Berlin.
- Ossiannilsson, F. 1952. Catalogus insectorum Sueciae XII. Hemiptera, Homoptera, Psylloidea. *Opuscula Entomologica* **17**: 193–200.
- 1963. Notes on British psyllids (Hem., Hom.). *Entomologist* **96**: 249–257.
- 1971. Till Kannedomen om Kullabergs Halvvingar (Hemiptera). *Kullabergs Natur* **14**: 1–55.
- Petty, F. W. 1924. South African psyllids. *Entomology Memoirs, Department of Agriculture, Union of South Africa* **2**: 21–30.
- 1925. New South African psyllids. *South African Journal of Natural History* **5**: 125–142.
- 1933. New species of South African Psyllids 3. *Entomology Memoirs, Department of Agriculture, Union of South Africa* **8**: 3–23.
- Pflugfelder, O. 1941. Psyllina. In Bronns, H. G. (Ed.), *Klassen und Ordnungen des Tierreichs*. **4**: part 3, book 8. Leipzig.
- Preisner, H. 1927. Eine neue *Psylla* aus den Ostalpen (*P. prohasakai*). *Konowia* **6**: 263–266.
- Prohaska, K. 1928. Beitrag zur Kenntnis der Psylliden (Blattflohle) Karntens. *Zeitschrift des Österreichischen Entomologen-Vereins* **13**: 4–6.
- Puton, A. 1871. Description de deux nouvelles espèces de Psyllides. *Annales de la Société Entomologique de France* **1**: 435–439.
- 1873. Notes pour servir à l'étude des Hémiptères. *Annales de la Société Entomologique de France* **3**: 11–26.
- 1876. Notes pour servir à l'études des Hémiptères. Description des espèces nouvelles ou peu connues. *Annales de la Société Entomologique de France* **6**: 275–290.
- 1878. *Psylla (Arytaina) retamae* Puton. *Bulletin de la Société Entomologique de France* **1878**: CXXXIV–CXXXV.
- 1886. *Catalogue des Hémiptères de la faune Paléarctique*, 3rd edn, 99 pp. Caen.
- 1899. *Catalogue des Hémiptères de la faune paléarctique*, 4th edn, 121 pp. Caen.
- Ragusa, E. 1907. Emmitteri di Sicilia. *Il Naturaliste siciliano* **19**: 209–237.
- Ramirez Gomez, C. 1956. Los Psilidos de España. *Boletin de la Real Sociedad Española de Historia Natural (Biológica)* **54**: 63–106.
- Rapisarda, C. 1985. Sulla presenza in Italia di *Acizzia acaciaebaileyanae* (Froggatt) (Homoptera, Psylloidea), nuovo parassita di Acacie ornamentali. *Informatore Fitopatologico* **10**: 45–49.
- Reiber, F. & Puton, A. 1880. Catalogue des Hémiptères-Homoptères de l'Alsace et de la Lorraine et supplement au catalogue de Hémiptères-Hétéroptères. *Bulletin de la Société d'Histoire Naturelle de Colmar* **20–21**: 49–77.
- Reuter, O. M. 1875. Heteropterorum novorum species aliquot descripsit. *Notiser ur Sällskapetets pro Fauna et Flora Fennica Förhandlingar*, **11**: 328–333.
- 1881. Till Kannedomen om sveriges Psylloder. *Entomologisk Tidskrift* **2**: 145–172.

- 1909. Charakteristik und Entwicklungsgeschichte der Hemipteren-Fauna (Heteroptera, Auchenorrhyncha und Psyllidae) der paläarktischen Coniferen. *Acta Societatis Scientiarum Fennicae* **36**: 1–129.
- Rudow, F.** 1875. Zur Kenntnis der Psylliden Norddeutschlands. *Programm der Realschule in Neustadt-Eberwede* **1875**: 3–14.
- Samy, O.** 1973. Psyllids of Egypt [Homoptera: Psyllidae]. *Bulletin de la Société Entomologique d' Egypte* **56**: 437–480.
- Schaefer, H. A.** 1949a. Beiträge zur Kenntnis der Psylliden der Schweiz. *Mitteilungen der Schweizerischen Entomologischen Gesellschaft* **22**: 1–96.
- 1949b. Biologische und ökologische Beobachtungen an Psylliden (Hemiptera). *Verhandlungen der Naturforschenden Gesellschaft in Basel* **60**: 25–41.
- Schwarz, E. A.** 1904. Notes on North American Psyllidae. *Proceedings of the Entomological Society of Washington* **6**: 234–245.
- Scott, J.** 1876. Monograph of the British species belonging to the Hemiptera – Homoptera, family Psyllidae. *Transactions of the Entomological Society of London* **24**: 525–569.
- 1879. Description of a new species of the family Psyllidae – *Floria horvathi* n. sp. *Entomologist's Monthly Magazine* **16**: 84–85.
- 1880. Description of the nymph of *Arytaina genistae* Latr. *Entomologist's Monthly Magazine* **17**: 132–133.
- 1882a. Food plants and times of appearance of the species of Psyllidae found in Great Britain together with others which may be expected to occur here. *Entomologist's Monthly Magazine* **19**: 13–15.
- 1882b. The British Psyllina, with corrections in the synonymy. *Entomologist's Monthly Magazine* **18**: 253–256.
- Smreczynski, S.** 1954. Materialy dö fauny pluskwiakow Polski 3. Psylloidea. *Fragmenta Faunistica* **7**: 1–146.
- Šulc, K.** 1905. Revise Psyll sbirky Dudovy. *Casopis Ceskoslovenske Spolecnosti Entomologicke* **2**: 1–4.
- 1907. Prispěvky ku poznani Psyll. 1. *Psylla spartii* Guerin-Loew a *Psylla spartiicola* n. sp. *Rozpravy Ceske Akademie Ved, Praha (section 2)* **16**: 1–8.
- 1910a. Uvod do studia, synoptika tabulka a synonymicky katalog druhu rodu *Psylla*, palaearticke oblasti. *Sitzungsberichte der K. Böhmischen Gesellschaft der Wissenschaften* **2** (1909): 1–46.
- 1910b. Prispěvky k poznani II. *Rozpravy Ceske Akademie Ved, Praha (section 2)* **19**: 1–32.
- Szulczewski, J. W.** 1927. Materialien zur Psyllidfauna Grosspolens. *Sprawozdania Komisji Fizyograficznej Oraz Materialy do Fiziografii Kraju* **61**: 197–204.
- Tamanini, L.** 1955. Alcuni nuovi repert di Psyllidi Italiani e Francesi (Homoptera, Psyllina). *Bollettino della Societa Entomologica Italiana* **85**: 10–11.
- 1977. Notizie corologiche e morfologiche su alcuni psyllidi poco noti delle prealpi (Homoptera: Psylloidea). *Studi Trentini di Scienze Naturali* **54**: 103–119.
- Thomson, C. C.** 1877. XXIX. Öfversigt af Skandinaviens *Chermes*-arter. *Opuscula Entomologica* (Editit C. G. Thomson), Trelleborg **8**: 820–841.
- Tuthill, L. D.** 1943. The Psyllids of North America north of Mexico (Psyllidae: Homoptera) (Subfamilies Psyllinae and Triozinae). *Iowa State College Journal of Science* **17**: 443–660.
- 1952. On the Psyllidae of New Zealand. *Pacific Science* **6**: 83–125.
- 1964. Homoptera, Psyllidae. *Insects of Micronesia* **6**: 353–376.
- Tutin, T. G. et al.** (Eds) 1964–1980. *Flora Europaea*. Cambridge.
- Van der Goot, P.** 1912. Naamlist van inlandsche Psyllidae. *Entomologische Berichten, Amsterdam* **3**: 281–285.
- Van Duzee, E. P.** 1917. Catalogue of the Hemiptera of America north of Mexico excepting the Aphididae, Coccidae and Aleurodidae. *University of California Publications, Technical Bulletin* **2**: 1–902.
- Vane-Wright, R. I.** 1978. Ecological and behavioural origins of diversity in butterflies. In Mound, L. A. & Waloff, N. (Eds), Diversity of insect faunas. *Symposia of the Royal Entomological Society of London* **9**: 56–70.
- Vondráček, K.** 1951a. A new Psyllid from Tanger. *Casopis Moravskeho Musea v Brne* **36**: 119–122.
- 1951b. Jumping plant-lice in the collections of the Moravian Museum (Brno). Melichar's collection revised, part 1. *Casopis Moravskeho Musea v Brne* **36**: 123–131.
- 1952. Results of zoological scientific expedition of the National Museum in Praha to Turkey. *Sborník Entomologického Oddělení Národního Musea v Praze* **28**: 435–450.
- 1953. Jumping plant-lice in the collections of the Moravian Museum (Brno). *Casopis Moravskeho Musea v Brne* **38**: 174–179.
- 1957. Mery Psylloidea. *Fauna CSR* **9**: 1–431.

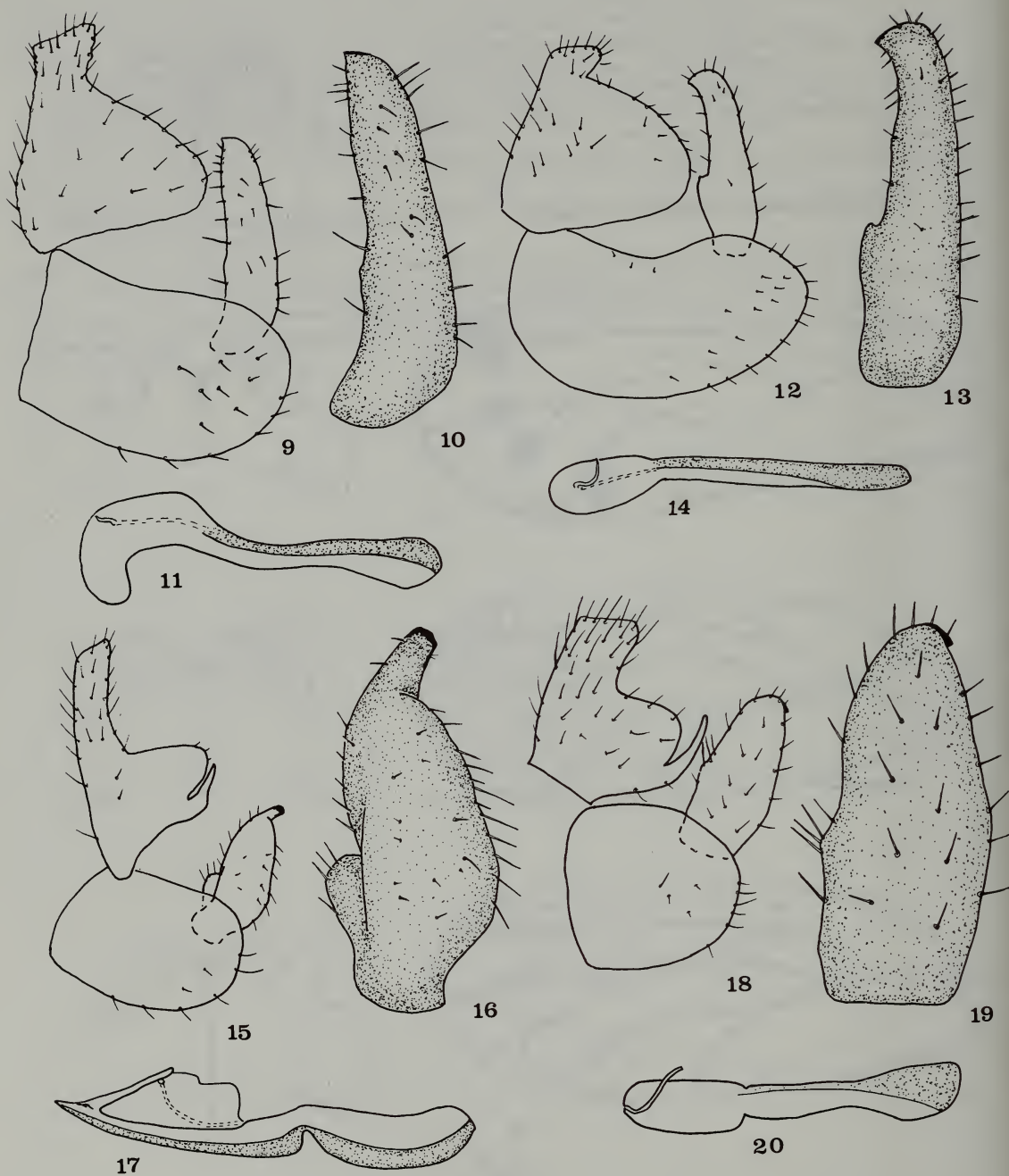


- Wagner, W. & Franz, H. 1961. Überfamilie Sternorrhyncha (Psylloidea), pp. 158–179. In Franz, H. (Ed.), *Die Nordst-Alpen im Spiegel ihrer Landtierwelt* 2: 729 pp.
- Wahlgren, E. 1934. Svenska bladdlopper (Chermesidae). *Entomologisk Tidskrift* 55: 81–104.
- Waltl, J. 1837. Bemerkungen über einige Insekten. *Isis, Leipzig* 1837: 277–279.
- Watmough, R. H. 1968a. Population studies on two species of Psyllidae (Homoptera: Sternorrhyncha) on broom (*Sarothamnus scoparius* (L.) Wimmer). *Journal of Animal Ecology* 37: 283–314.
- 1968b. Notes on the biology of *Arytaina spartiophila* Förster and *A. genistae* Latreille (Homoptera: Psyllidae) on broom (*Sarothamnus scoparius* (L.) Wimmer) in Britain. *Journal of the Entomological Society of Southern Africa* 31: 115–122.
- White, I. M. & Hodkinson, I. D. 1982. Psylloidea (Nymphal Stages). *Handbook for the Identification of British Insects* 2 (5b): 1–50.
- 1985. Nymphal taxonomy and systematics of the Psylloidea. *Bulletin of the British Museum (Natural History)* (Entomology) 50: 153–301.
- Yang, C. T. 1984. Psyllidae of Taiwan. *Taiwan Museum Special Publications Series* 3: 1–205.
- Yen, A. 1977. Redescription of the species of *Psylla* Geoffroy (Hemiptera: Psyllidae) originally described by Froggatt. *Journal of the Australian Entomological Society* 16: 7–20.
- Zgardinska, A. 1976. Koliszki (Homoptera: Psyllidae) Okolic Siedlec. *Polski Pismo Entomologiczne* 46: 241–246.

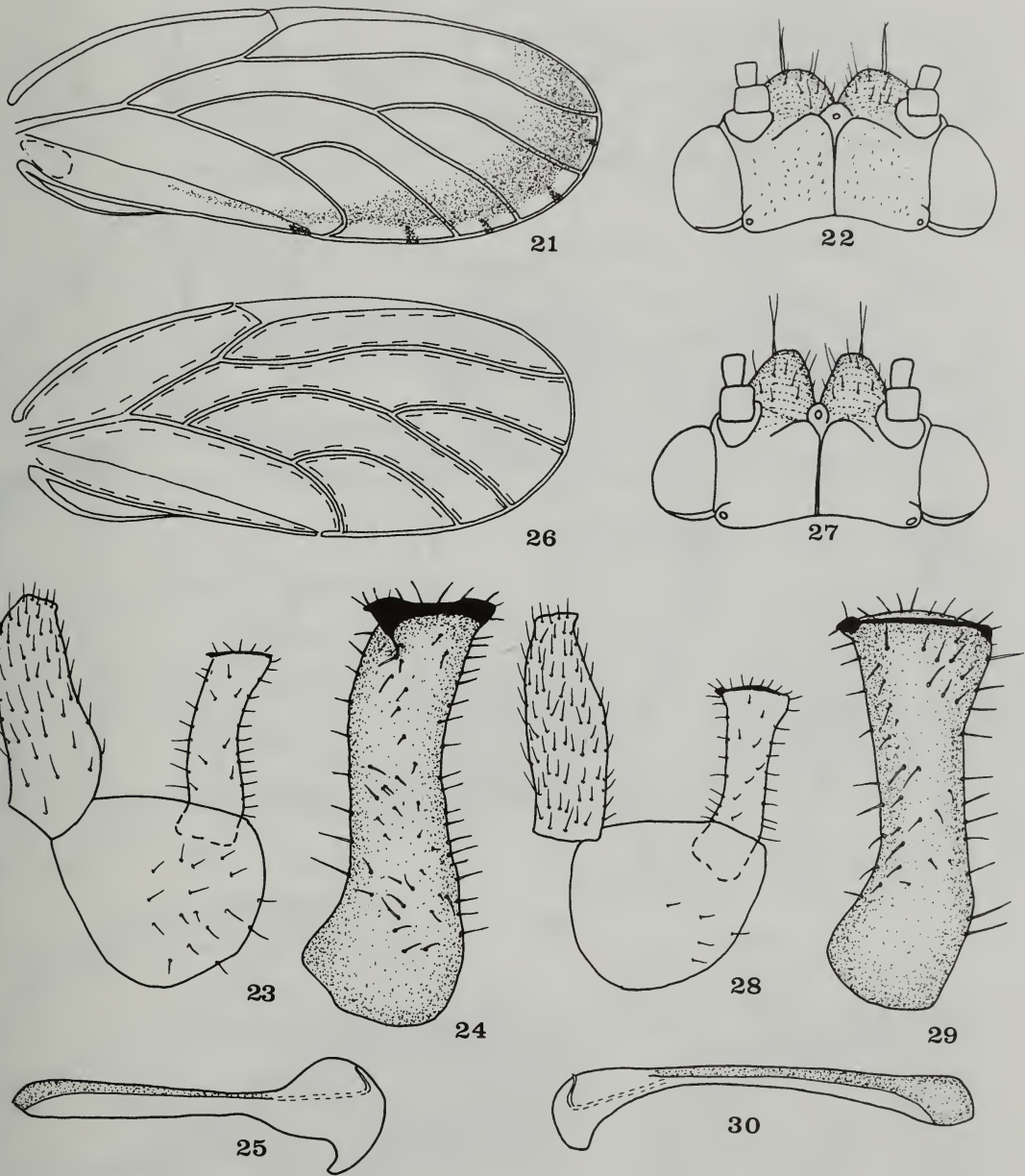


**Figs 1-8** *Acizzia* species. 1, 2, *bicolorata*: (1) forewing; (2) head. 3, 4, *hollisi*: (3) forewing; (4) head. 5, 6, *uncatoides*: (5) forewing; (6) head. 7, 8, *acaciaebaileyanae*: (7) forewing; (8) head.



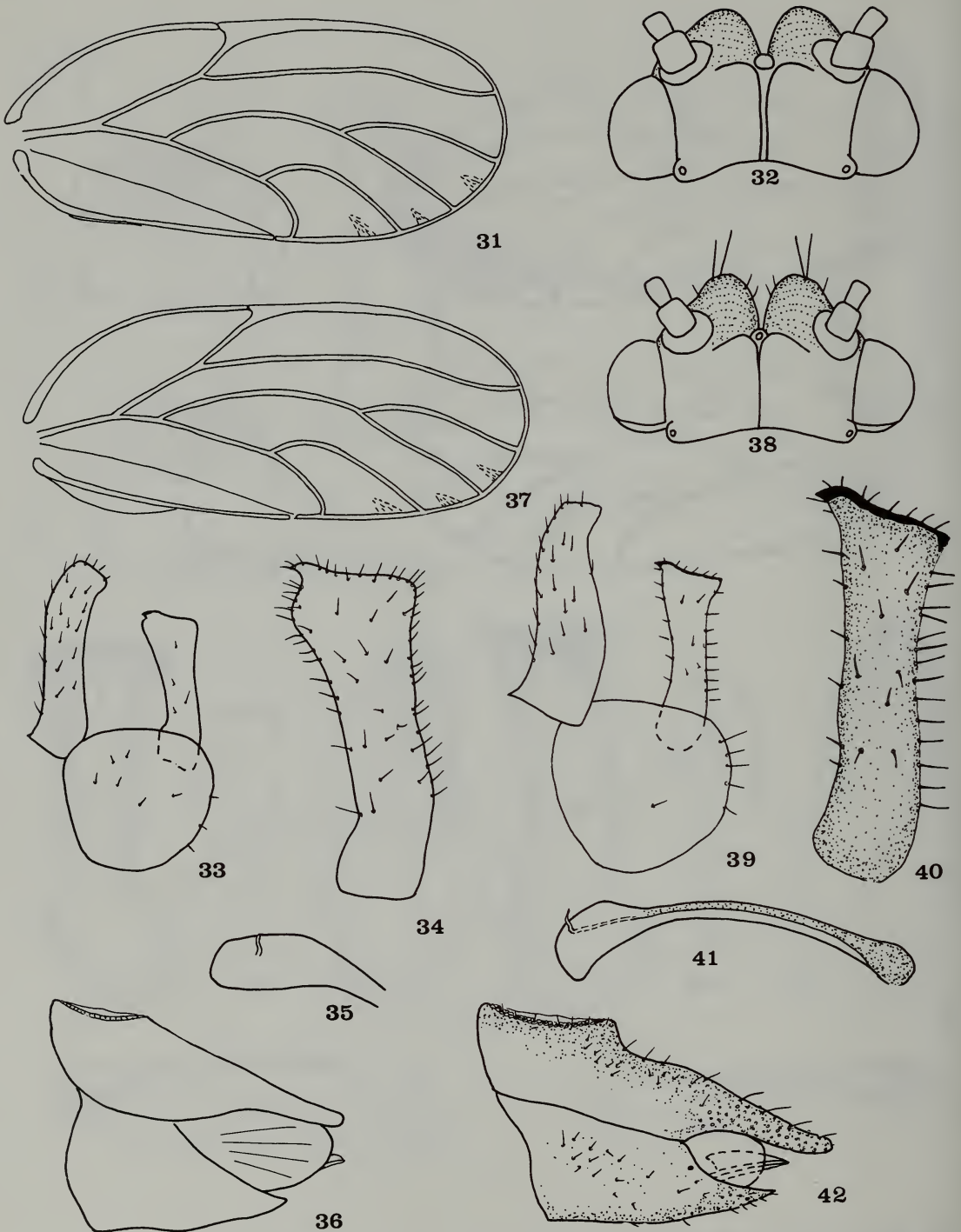


**Figs 9–20** *Acizzia* species. 9–11, *bicolorata*: (9) ♂ genitalia, lateral view; (10) ♂ paramere, outer view; (11) apical segment of aedeagus. 12–14, *hollisi*: (12) ♂ genitalia, lateral view; (13) ♂ paramere, outer view; (14) apical segment of aedeagus. 15–17, *uncatoides*: (15) ♂ genitalia, lateral view; (16) ♂ paramere, outer view; (17) apical segment of aedeagus. 18–20, *acaciaebaileyanae*: (18) ♂ genitalia, lateral view; (19) ♂ paramere, outer view; (20) apical segment of aedeagus.

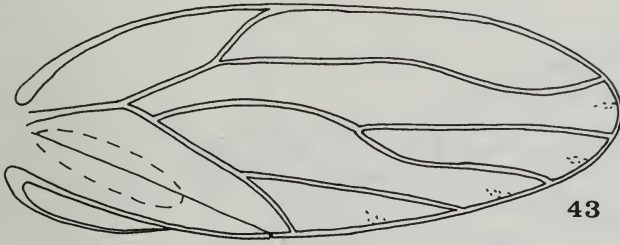


**Figs 21–30** *Cyamophila* species. 21–25, *glycyrrhizae*: (21) forewing; (22) head; (23) ♂ genitalia, lateral view; (24) ♂ paramere, inner view; (25) apical segment of aedeagus. 26–30, *prohaskai*: (26) forewing; (27) head; (28) ♂ genitalia, lateral view; (29) ♂ paramere, inner view; (30) apical segment of aedeagus.

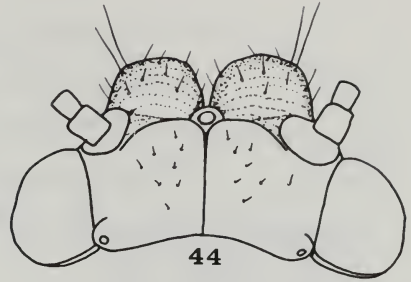




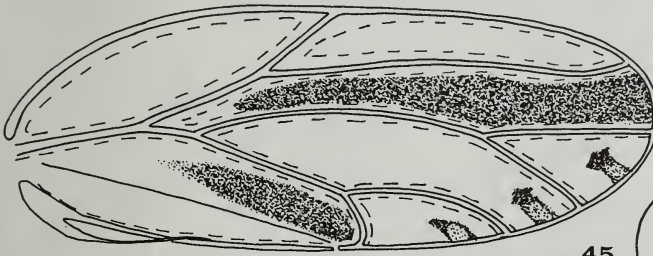
Figs 31-42 *Cyamophila* species. 31-36, *stoklosai* (after Klimaszewski & Lodos): (31) forewing; (32) head; (33) ♂ genitalia, lateral view; (34) ♂ paramere; (35) apical segment of aedeagus; (36) ♀ terminalia, lateral view. 37-42, *medicaginis*: (37) forewing; (38) head; (39) ♂ genitalia, lateral view; (40) ♂ paramere; (41) apical segment of aedeagus; (42) ♀ terminalia, lateral view.



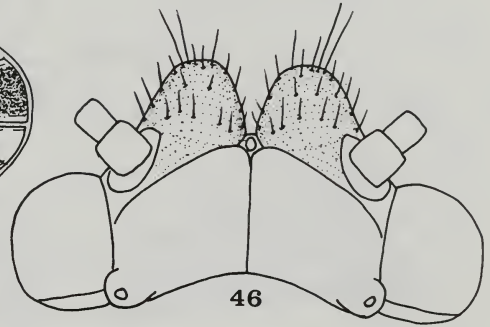
43



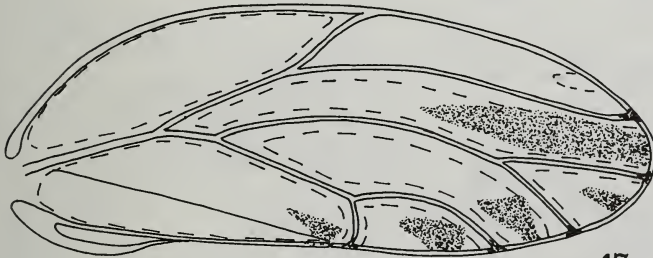
44



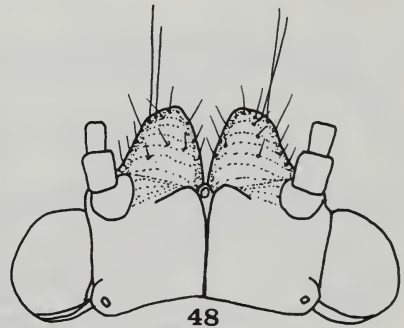
45



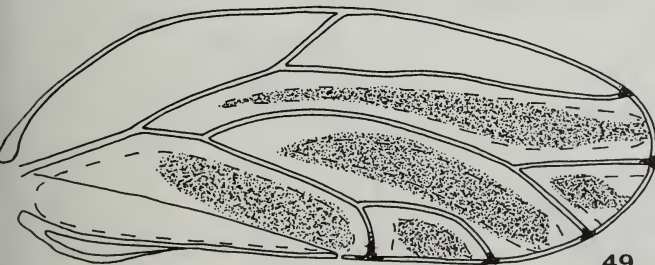
46



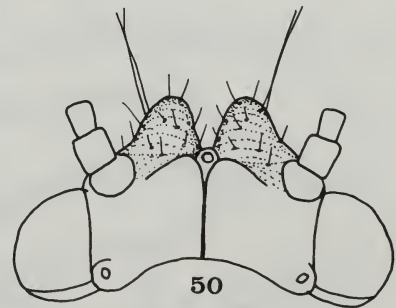
47



48

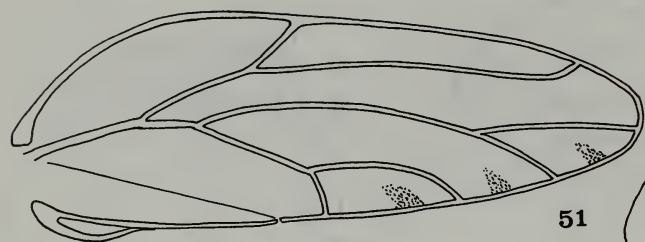


49

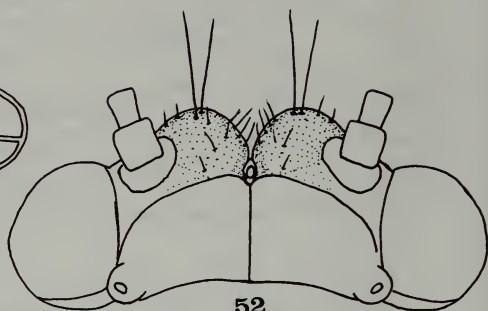


50

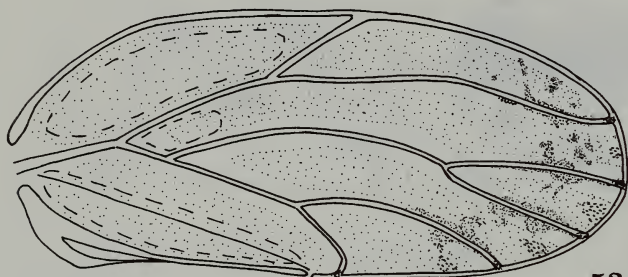
**Figs 43–50** *Arytaina* species. 43, 44, *longicella*: (43) forewing; (44) head. 45, 46, *genistae*: (45) forewing; (46) head. 47, 48, *maculata*: (47) forewing; (48) head. 49, 50, *maculata* (Spanish material): (49) forewing; (50) head.



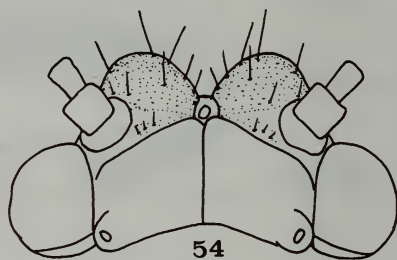
51



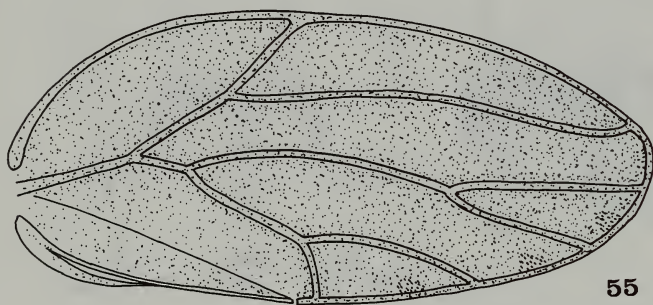
52



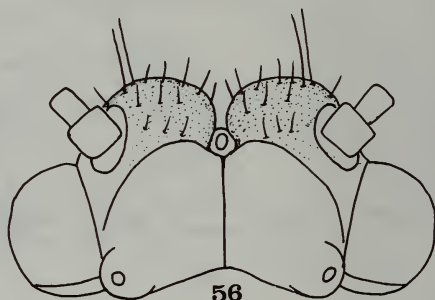
53



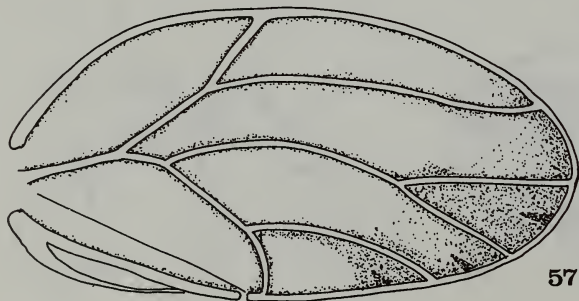
54



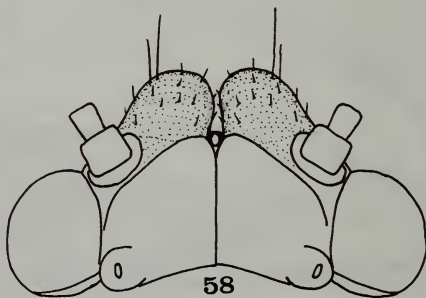
55



56



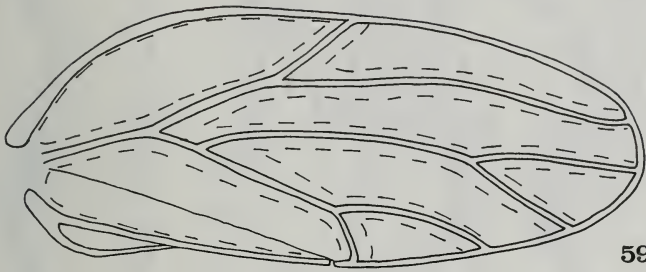
57



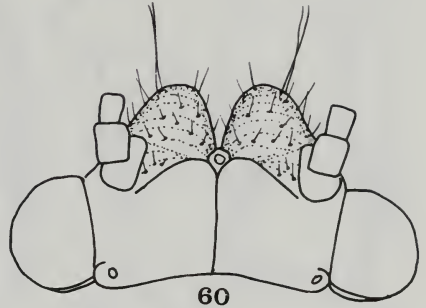
58

Figs 51–58 *Arytaina* species. 51, 52, *angustatipennis*: (51) forewing; (52) head. 53, 54, *atlasiensis*: (53) forewing; (54) head. 55, 56, *putonii*: (55) forewing; (56) head. 57, 58, *torifrons*: (57) forewing; (58) head.

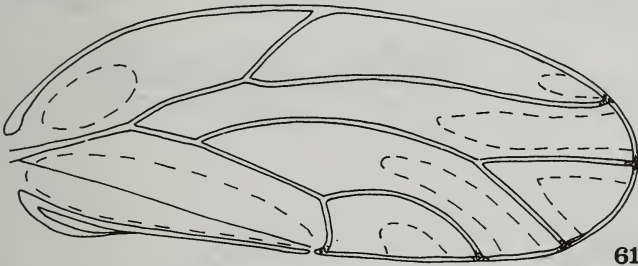




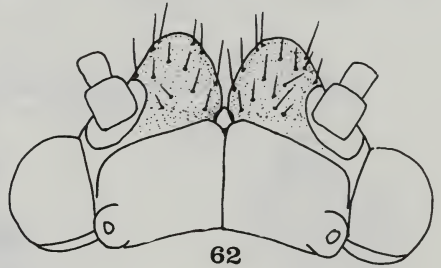
59



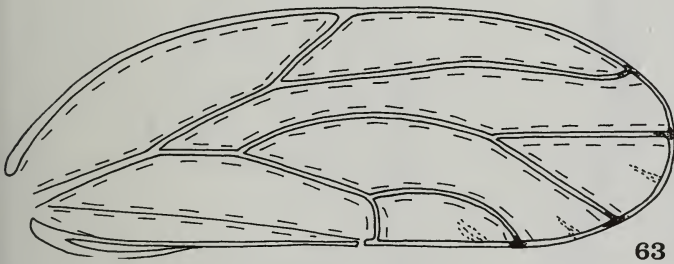
60



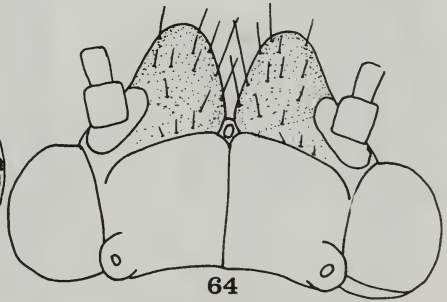
61



62

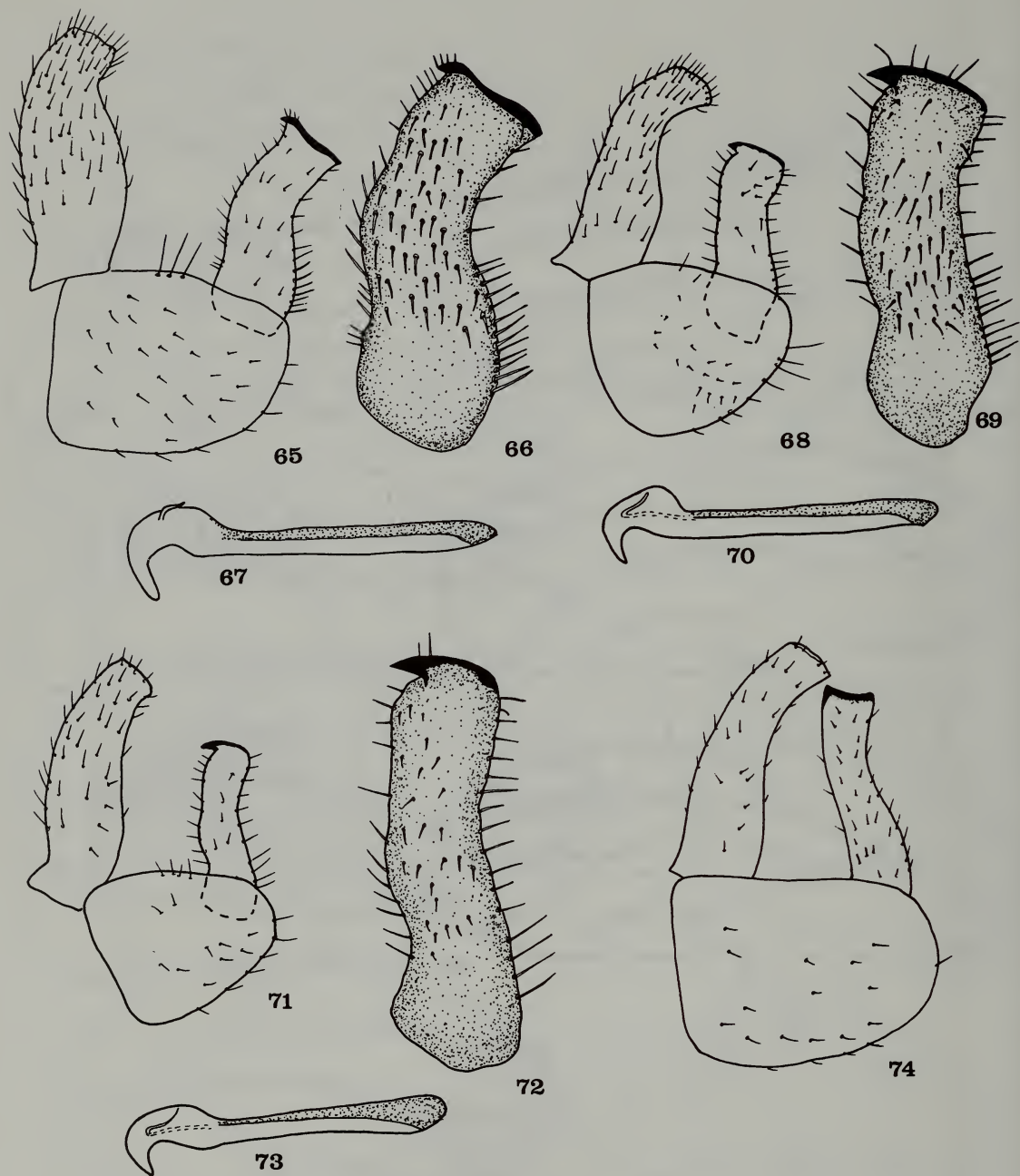


63

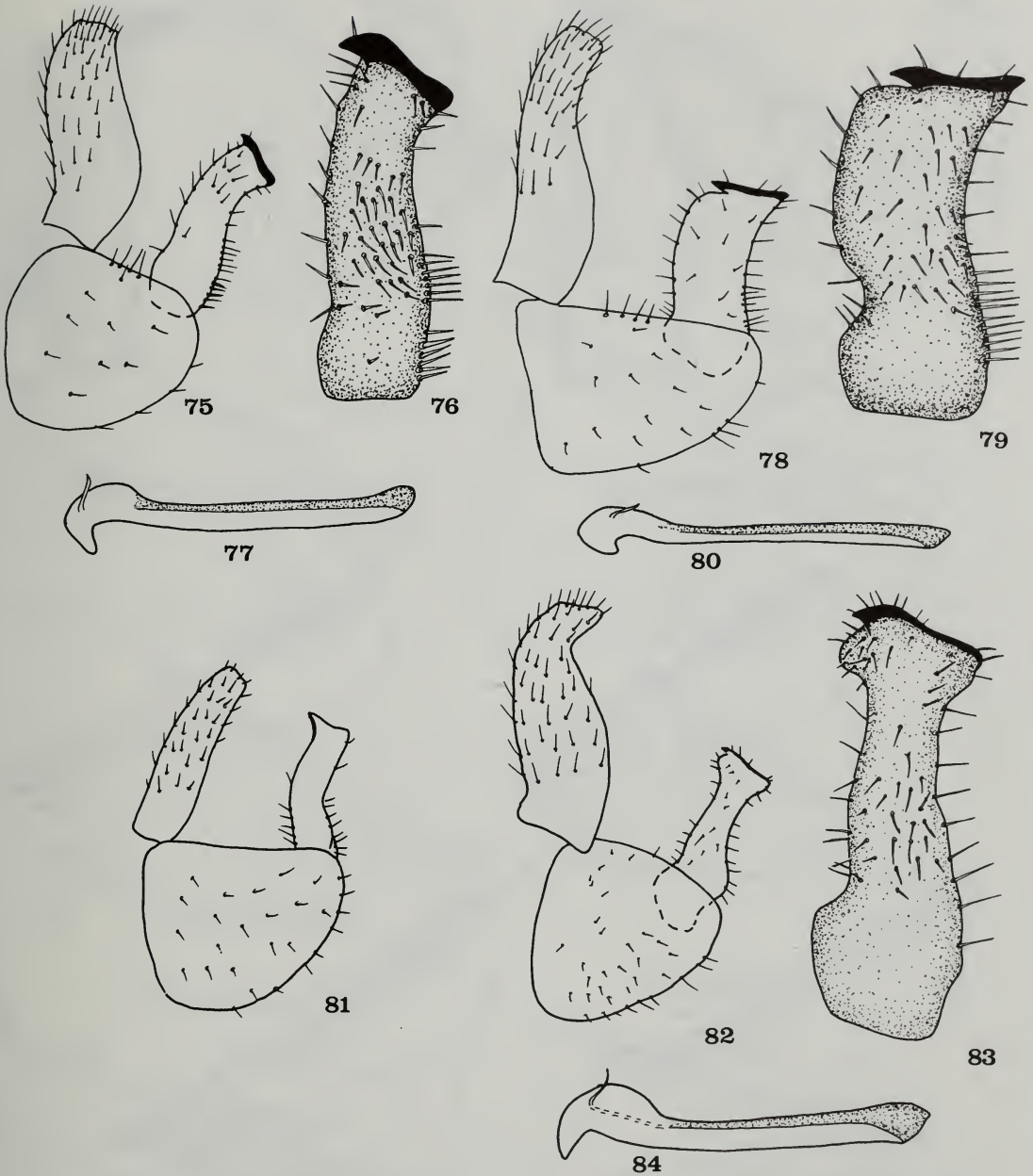


64

Figs 59–64 *Arytaina* species. 59, 60, *hispanica*: (59) forewing; (60) head. 61, 62, *adenocarpis*: (61) forewing; (62) head. 63, 64, *magnidentata*: (63) forewing; (64) head.

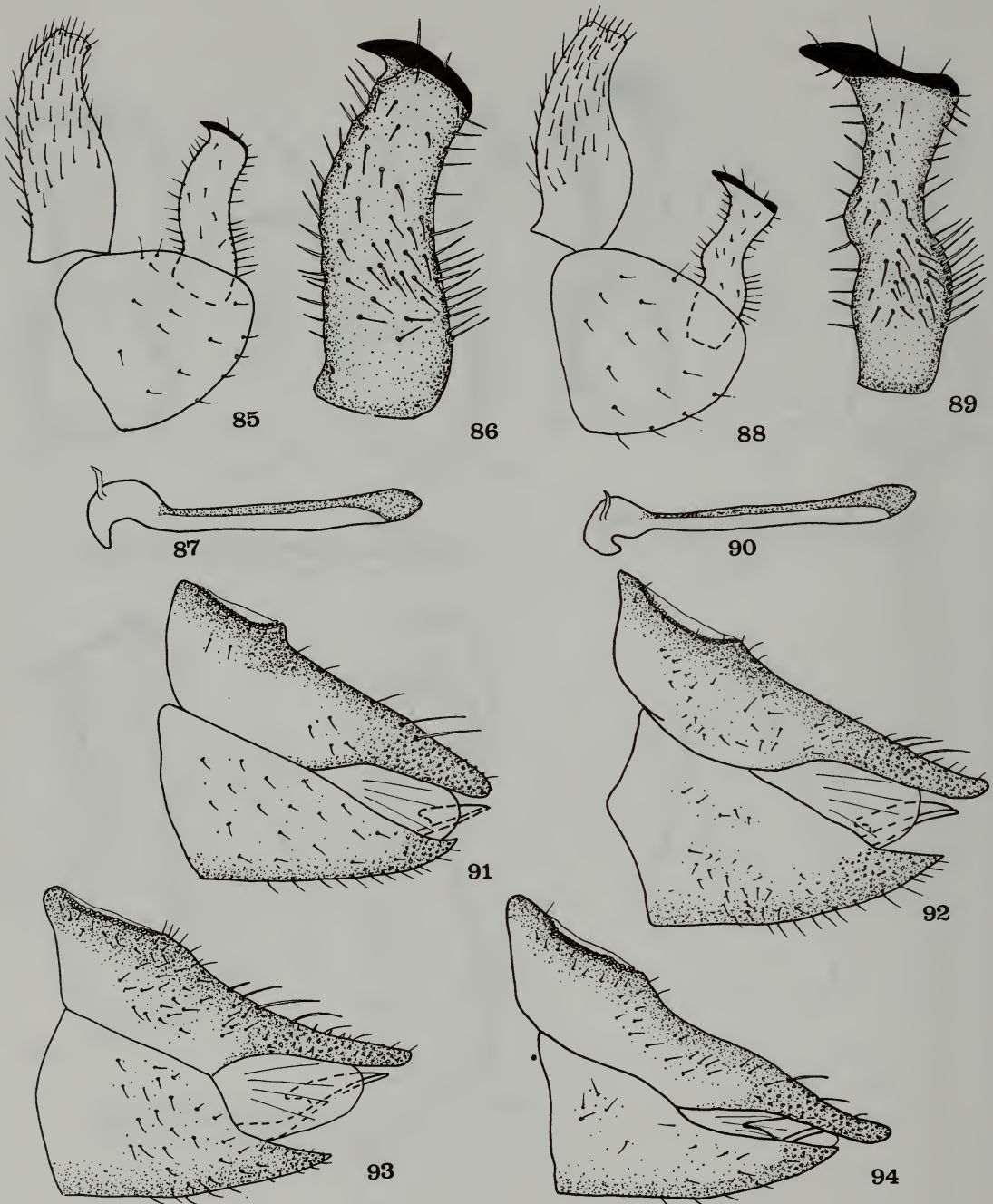


Figs 65-74 *Arytaina* species. 65-67, *genistae*: (65) ♂ genitalia, lateral view; (66) ♂ paramere, inner view; (67) apical segment of aedeagus. 68-70, *maculata*: (68) ♂ genitalia, lateral view; (69) ♂ paramere, inner view; (70) apical segment of aedeagus. 71-73, *maculata* (Spanish material): (71) ♂ genitalia, lateral view; (72) ♂ paramere, inner view; (73) apical segment of aedeagus. 74, *africana*: ♂ genitalia, lateral view (after Heslop-Harrison).

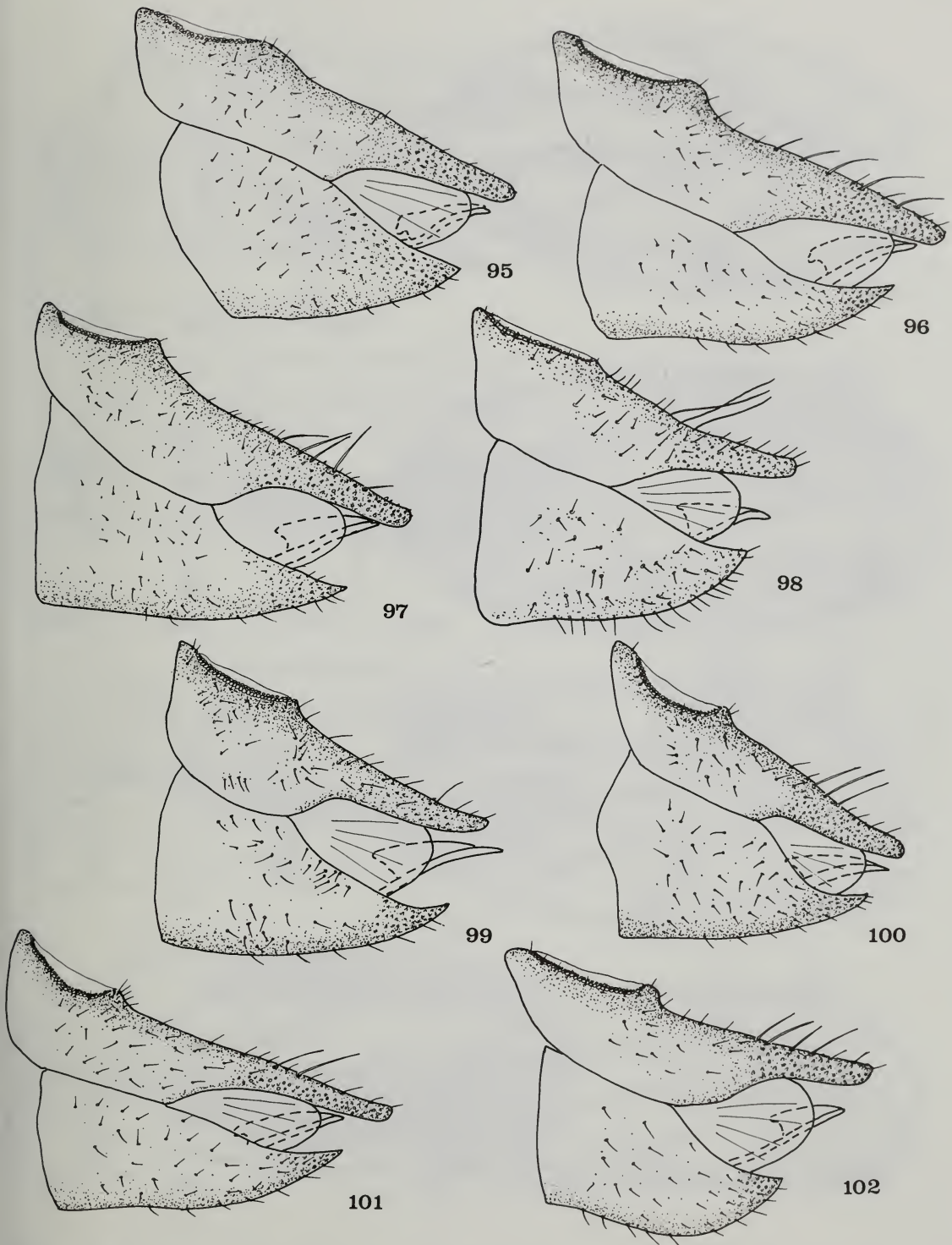


**Figs 75–84** *Arytaina* species. 75–77, *putonii*: (75) ♂ genitalia, lateral view; (76) ♂ paramere, inner view; (77) apical segment of aedeagus. 78–80, *torifrons*: (78) ♂ genitalia, lateral view; (79) ♂ paramere, inner view; (80) apical segment of aedeagus. 81, *angustatipennis*: ♂ genitalia, lateral view; 82–84, *hispanica*: (82) ♂ genitalia, lateral view; (83) ♂ paramere, inner view; (84) apical segment of aedeagus.

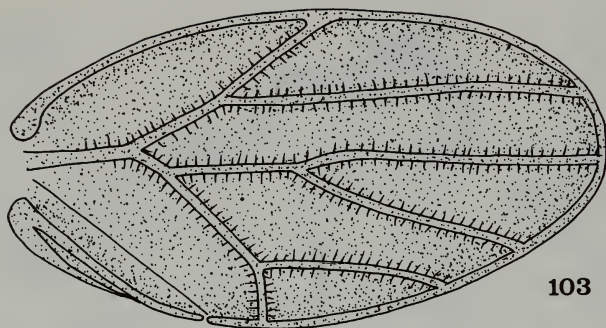




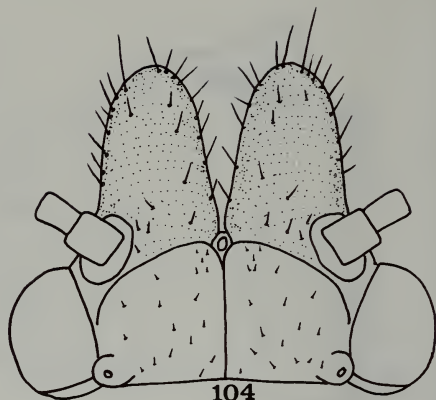
**Figs 85–94** *Arytaina* and *Cyamophila* species. 85–87, *A. adenocarpi*: (85) ♂ genitalia, lateral view; (86) ♂ paramere, inner view; (87) apical segment of aedeagus. 88–90, *A. magnidentata*: (88) ♂ genitalia, lateral view; (89) ♂ paramere, inner view; (90) apical segment of aedeagus. 91, *A. atlasiensis*: ♀ terminalia, lateral view. 92, *A. hispanica*: ♀ terminalia, lateral view. 93, *C. glycyrrhizae*: ♀ terminalia, lateral view. 94, *C. prohaskai*: ♀ terminalia, lateral view.



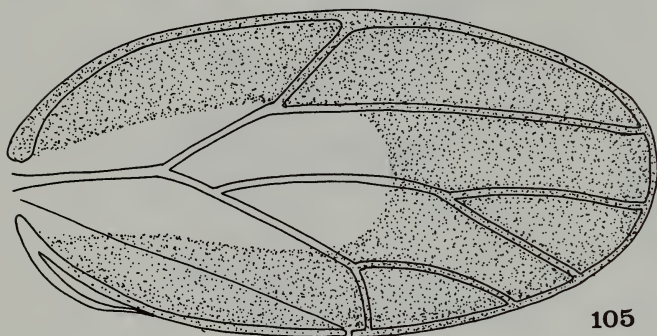
Figs 95–102 *Arytaina* and *Livilla* ♀ terminalia, lateral view. 95, *A. longicella*. 96, *A. genistae*. 97, *A. maculata*. 98, *L. radiata*. 99, *A. adenocarpi*. 100, *A. putonii*. 101, *A. angustatipennis*. 102, *A. torifrons*.



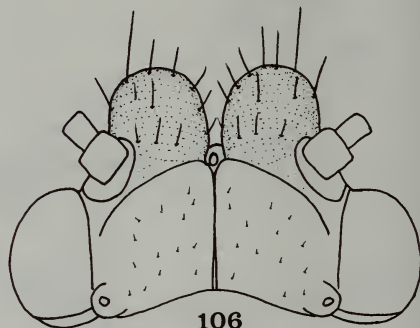
103



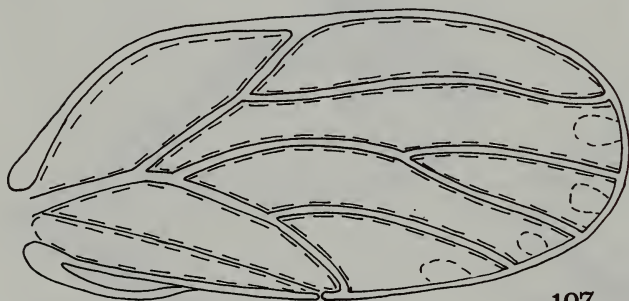
104



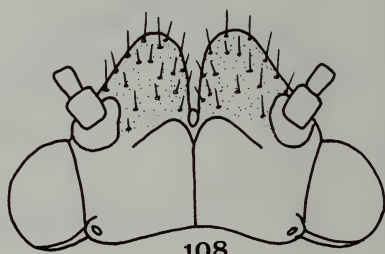
105



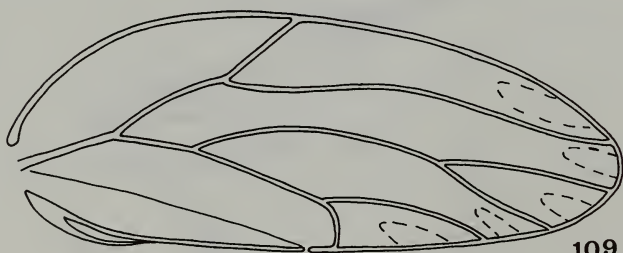
106



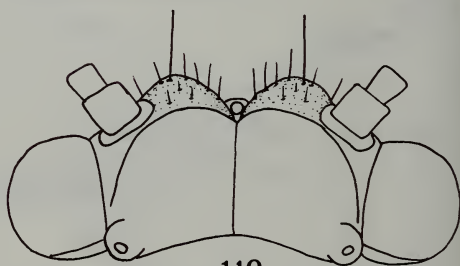
107



108



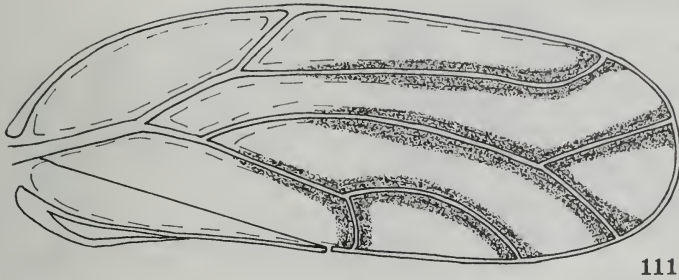
109



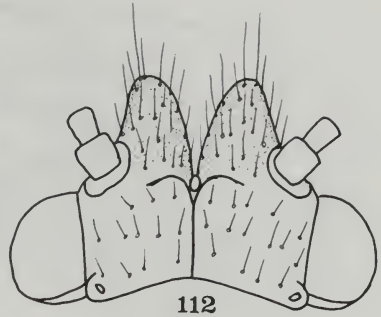
110

**Figs 103–110** *Livilla* species. 103, 104, *ulicis*: (103) forewing; (104) head. 105, 106, *bivittata*: (105) forewing; (106) head. 107, 108, *vicina*: (107) forewing; (108) head. 109, 110, *cognata*: (109) forewing; (110) head.

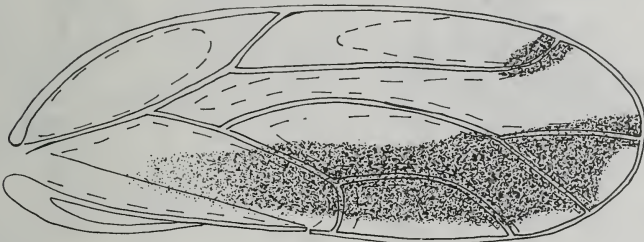




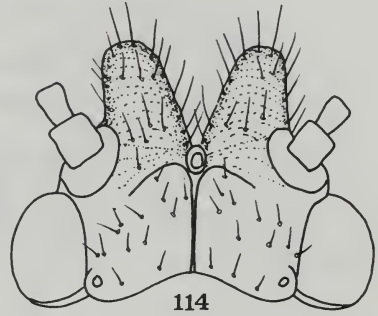
111



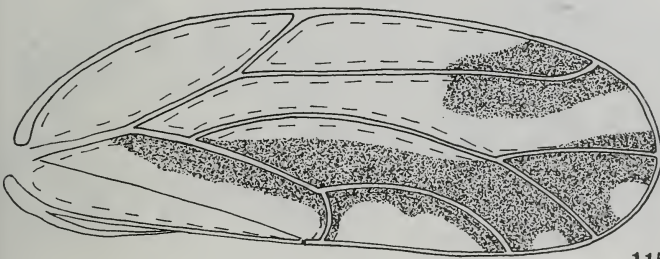
112



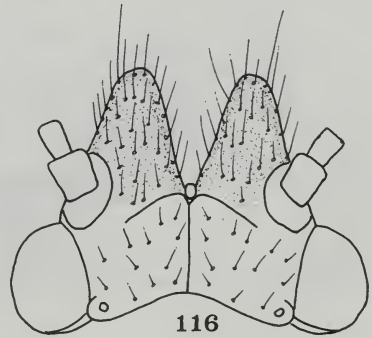
113



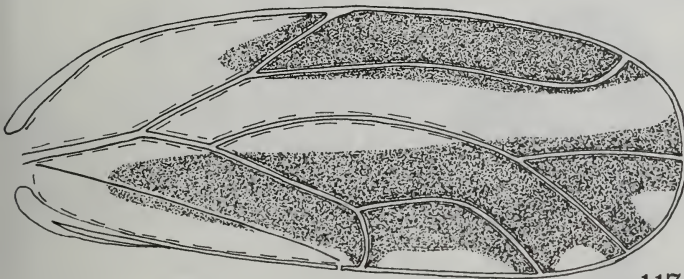
114



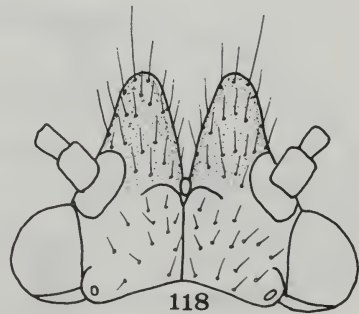
115



116

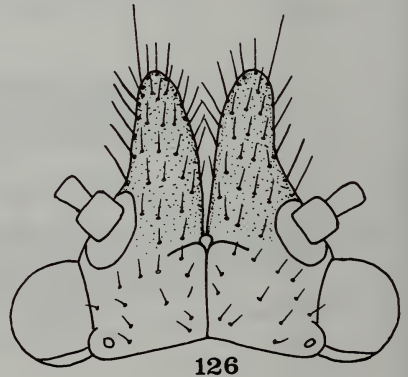
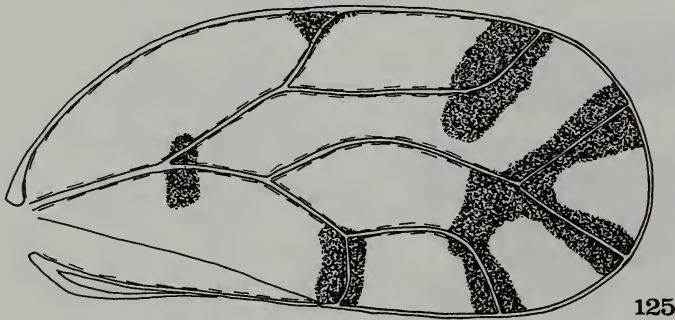
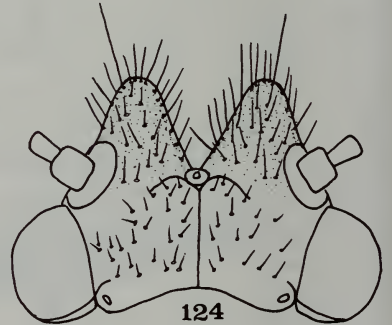
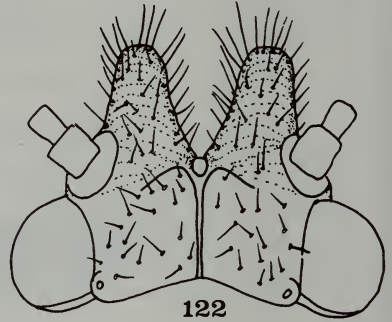
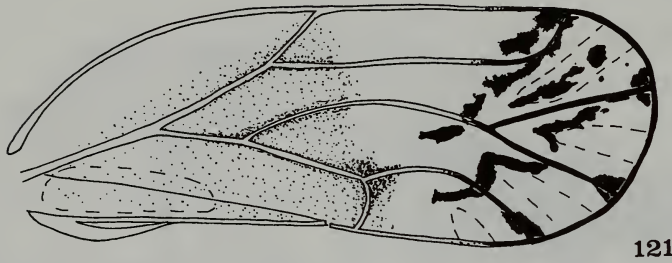
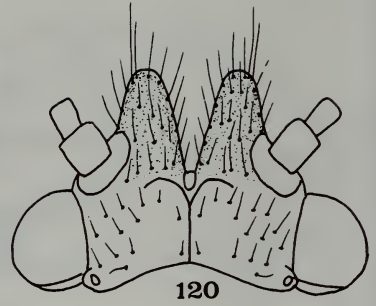
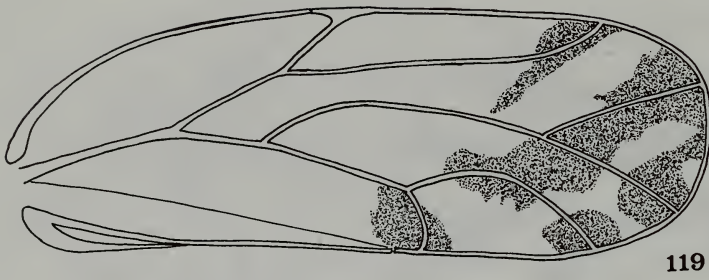


117



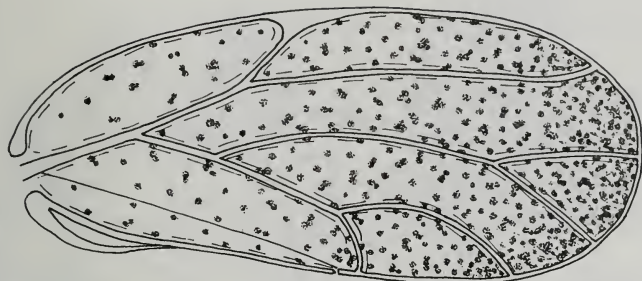
118

**Figs 111–118** *Livilla* species. 111, 112, *nervosa*: (111) forewing; (112) head. 113, 114, *nigralineata*: (113) forewing; (114) head. 115, 116, *horvathi*: (115) forewing; (116) head. 117, 118, *vitipennella*: (117) forewing; (118) head.

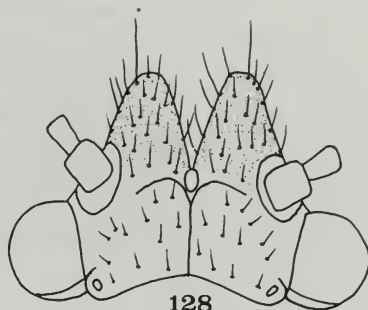


Figs 119–126 *Livilla* species. 119, 120, *retamae*: (119) forewing; (120) head. 121, 122, *lautereri*: (121) forewing; (122) head. 123, 124, *syriaca*: (123) forewing; (124) head. 125, 126, *radiata*: (125) forewing; (126) head.

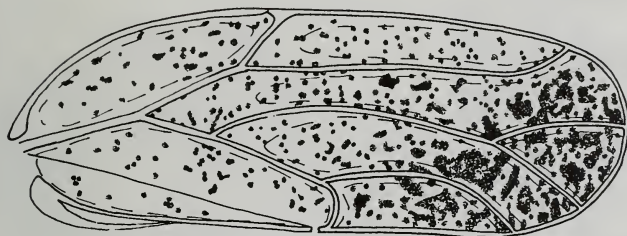




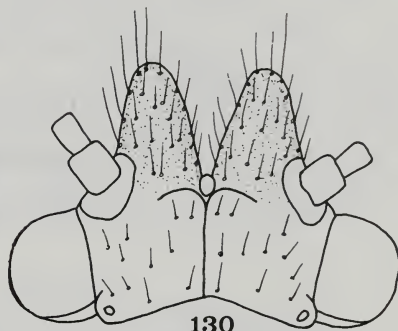
127



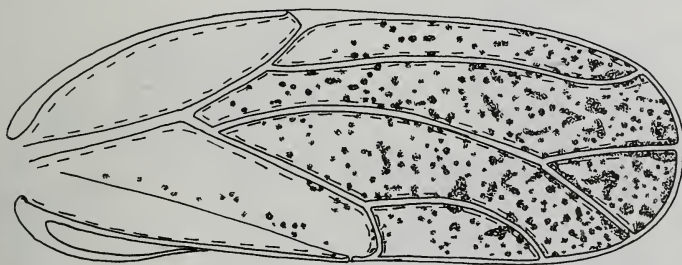
128



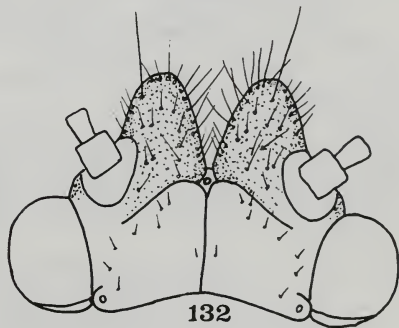
129



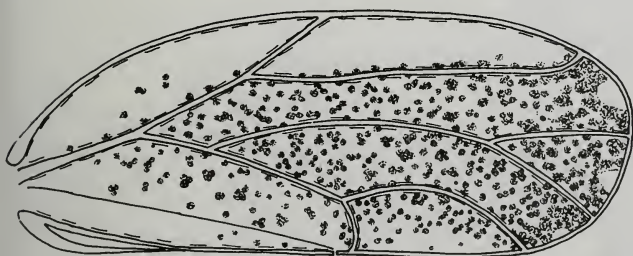
130



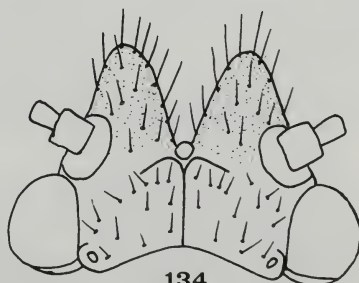
131



132



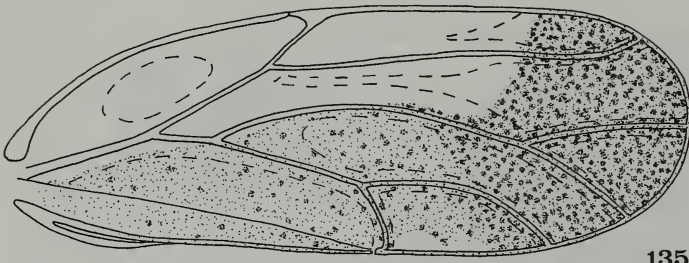
133



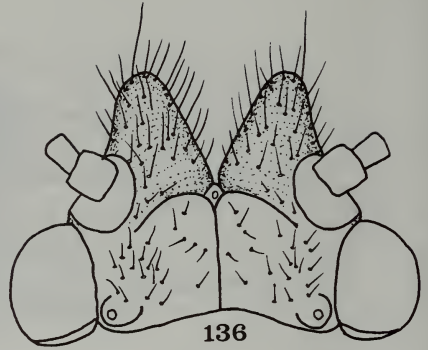
134

**Figs 127–134** *Livilla* species. 127, 128, *cataloniensis*: (127) forewing; (128) head. 129, 130, *maculipennis*: (129) forewing; (130) head. 131, 132, *siciliensis*: (131) forewing; (132) head. 133, 134, *pyrenaica*: (133) forewing; (134) head.

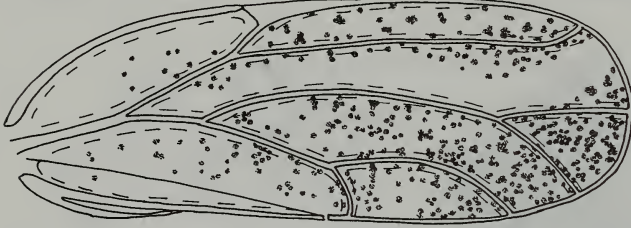




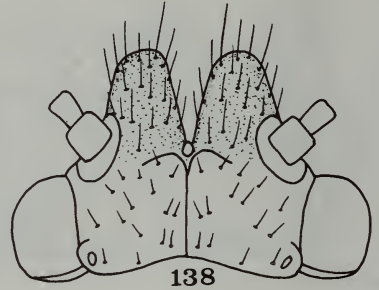
135



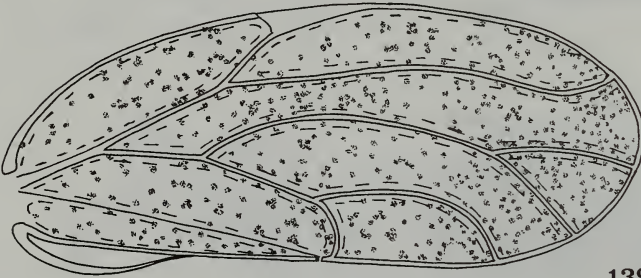
136



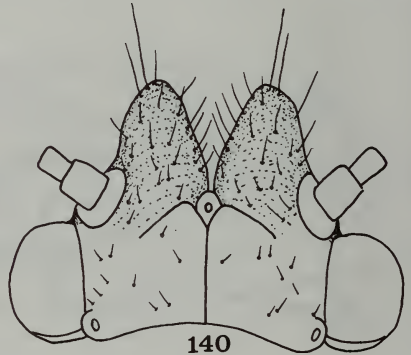
137



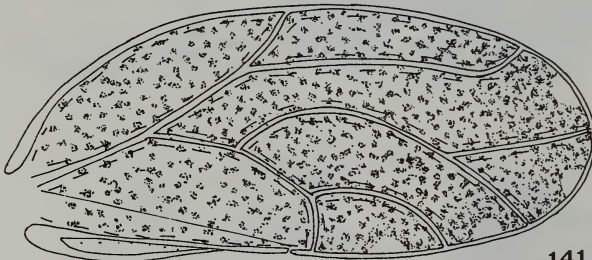
138



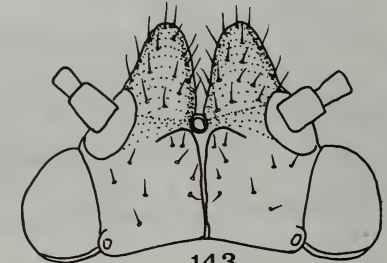
139



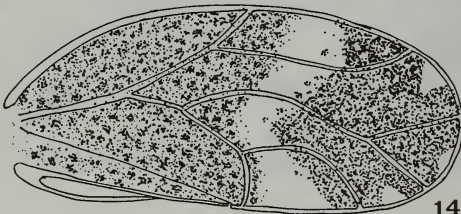
140



141

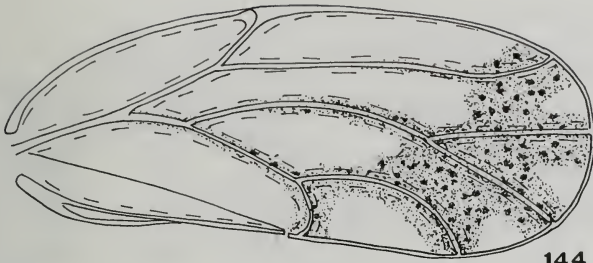


143

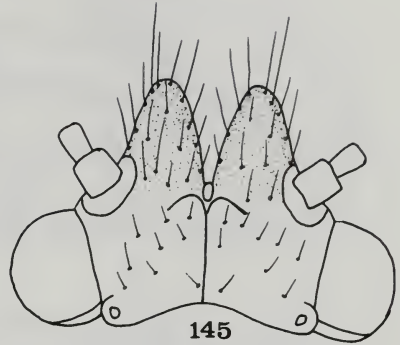


142

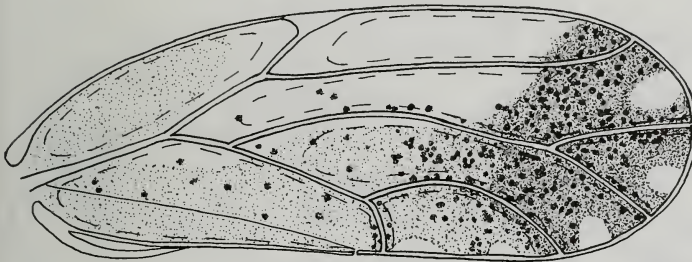
**Figs 135–143** *Livilla* species. 135, 136, *magna*: (135) forewing; (136) head. 137, 138, *spartiisuga*: (137) forewing; (138) head. 139, 140, *hodkinsoni*: (139) forewing; (140) head. 141–143, *poggii*: (141) ♀ forewing; (142) ♂ forewing; (143) head.



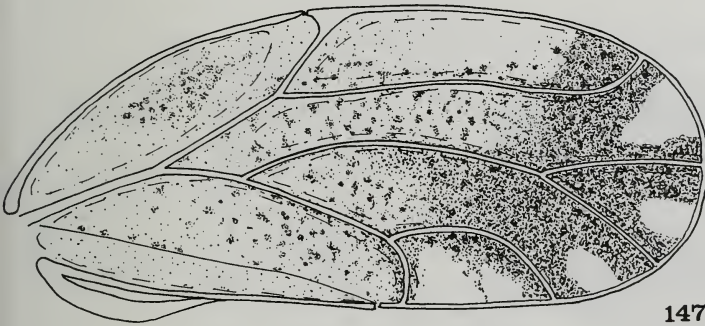
144



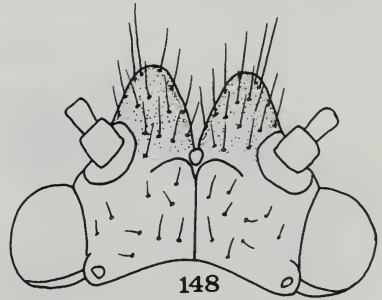
145



146



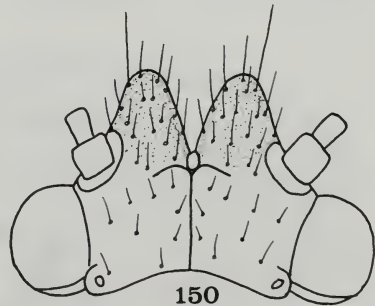
147



148



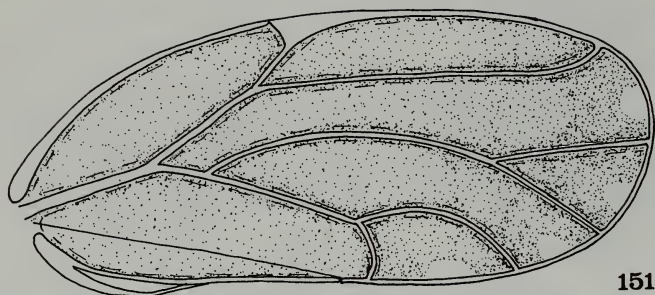
149



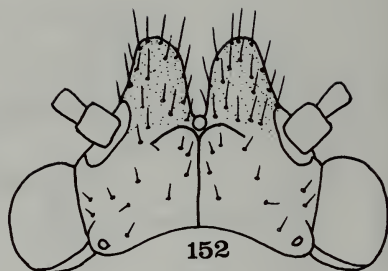
150

**Figs 144–150** *Livilla* species. 144–146, *blandula*: (144) forewing of lectotype; (145) forewing (Morocco); (146) head. 147, 148, *lusitanica*: (147) forewing; (148) head. 149, 150, *bimaculata*: (149) forewing; (150) head.

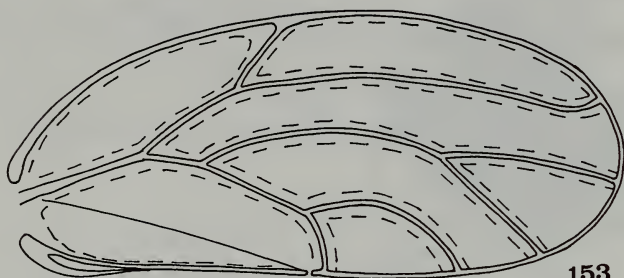




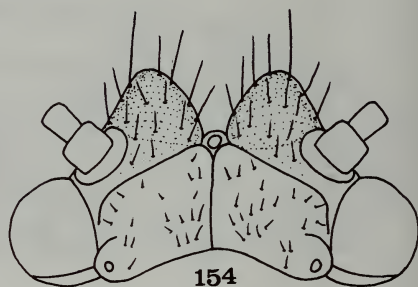
151



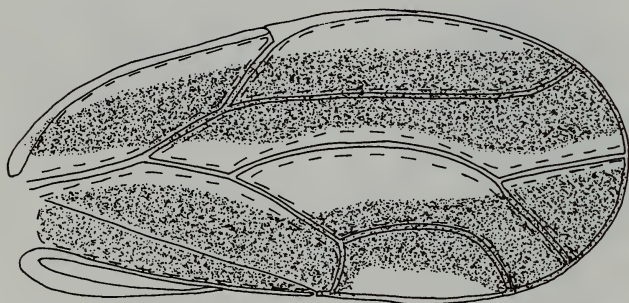
152



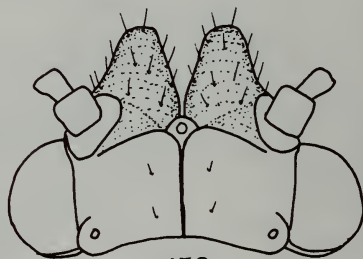
153



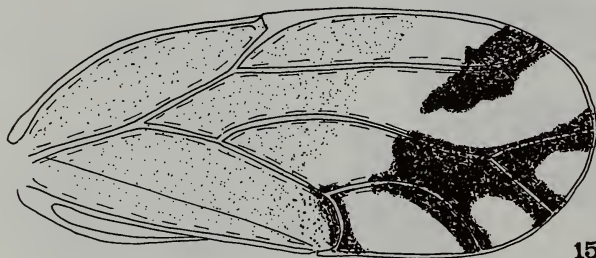
154



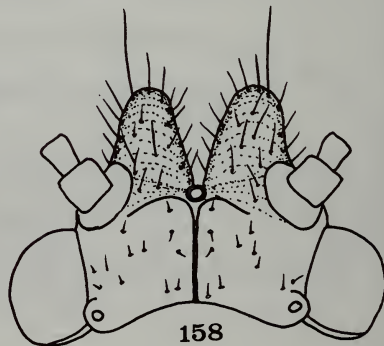
155



156



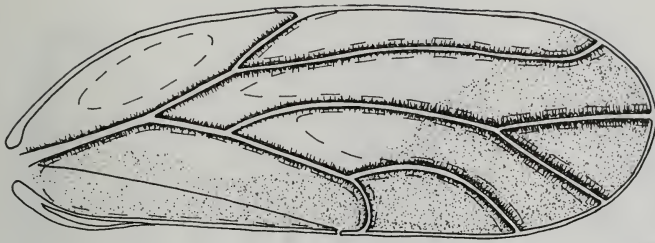
157



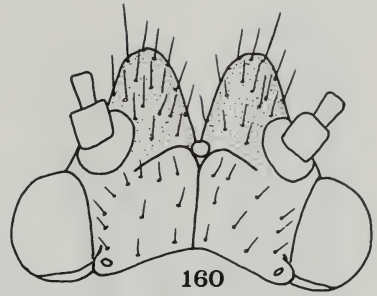
158

Figs 151–158 *Livilla* species. 151, 152, *maura*: (151) forewing; (152) head. 153, 154, *genistae*: (153) forewing; (154) head. 155, 156, *klapperichi*: (155) forewing; (156) head. 157, 158, *pseudoretamae*: (157) forewing; (158) head.

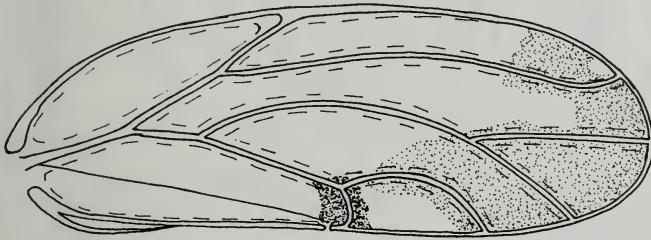




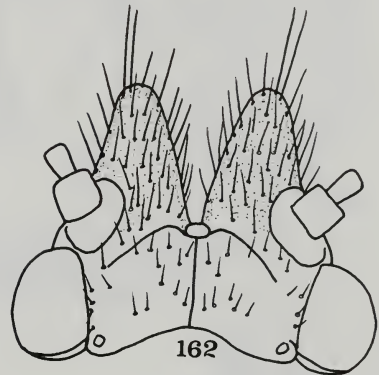
159



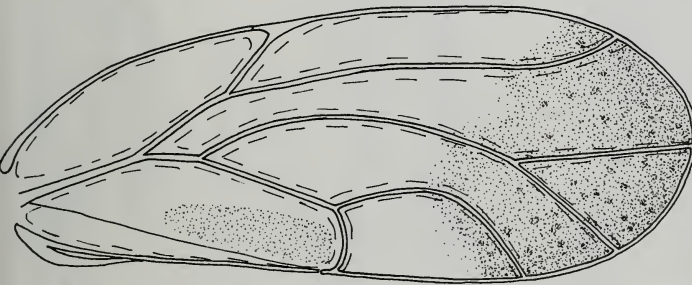
160



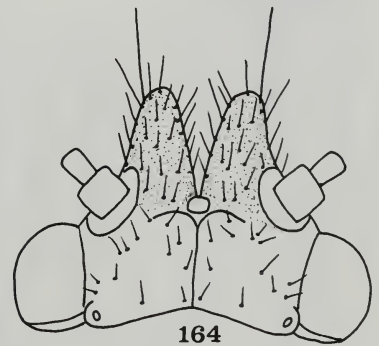
161



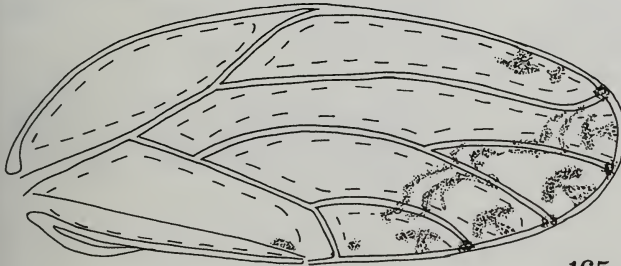
162



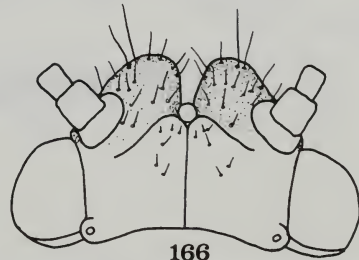
163



164

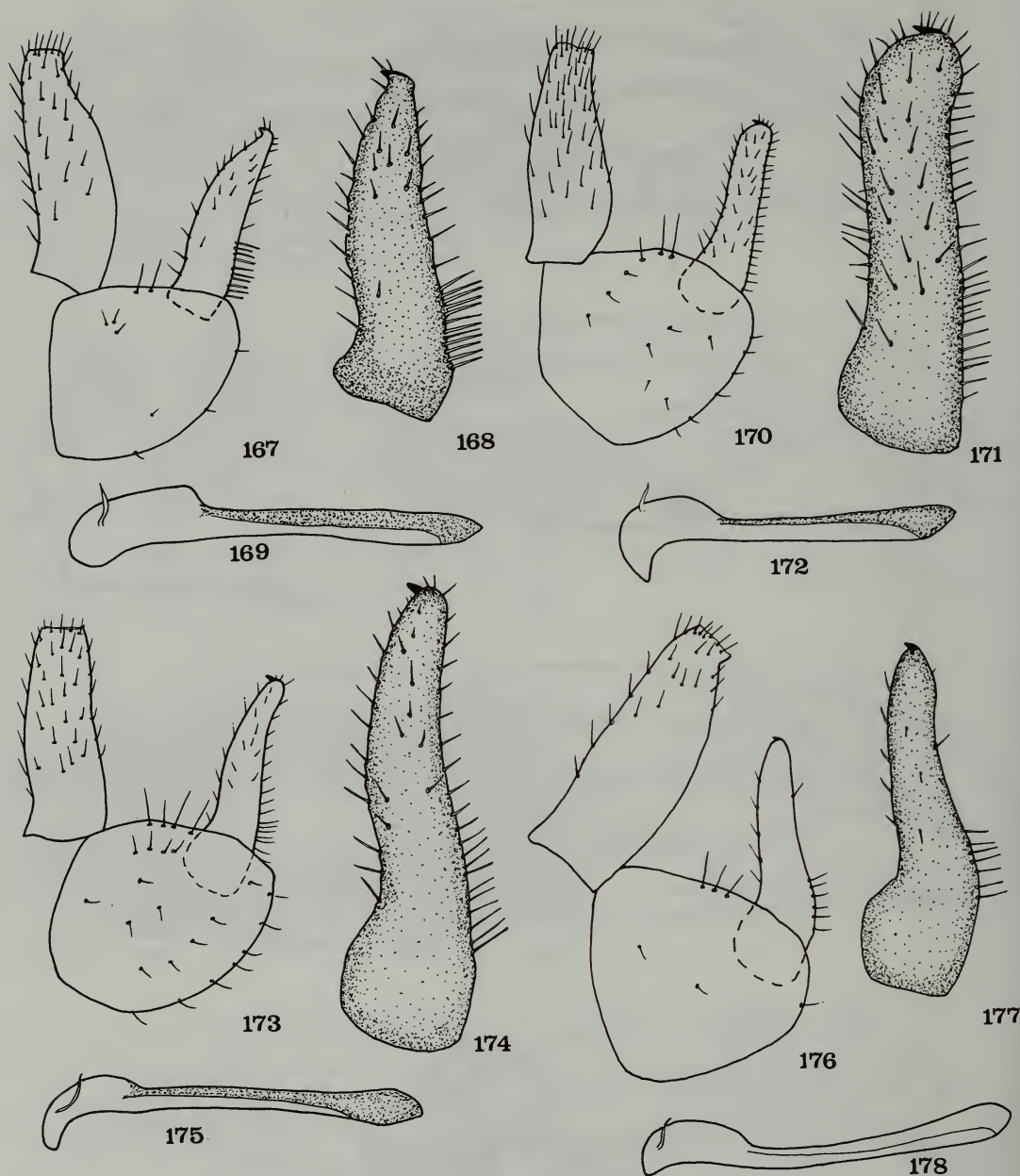


165

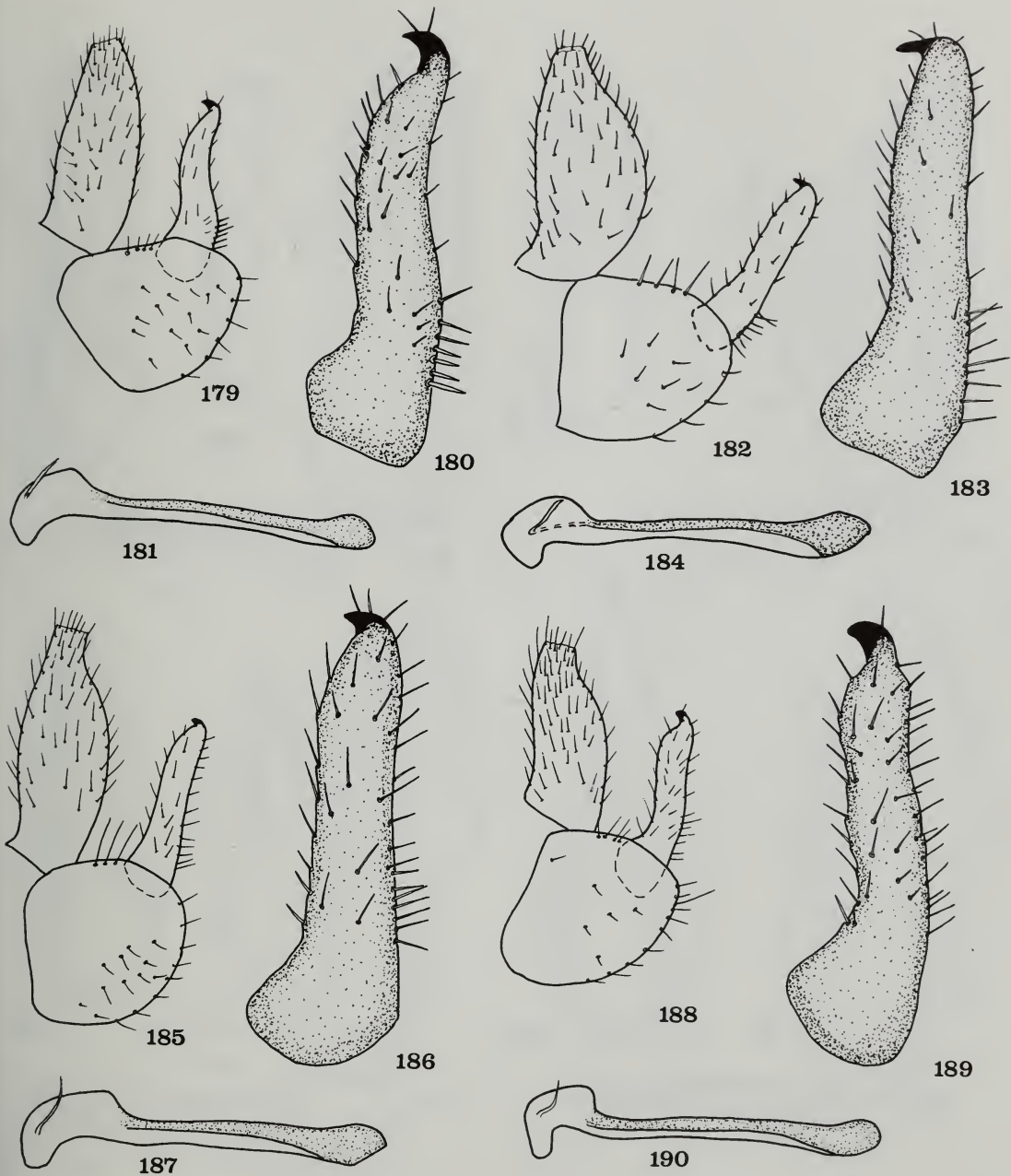


166

**Figs 159–166** *Livilla* species. 159, 160, *adusta*: (159) forewing; (160) head. 161, 162, *spectabilis*, (161) forewing; (162) head. 163, 164, *variegata*: (163) forewing; (164) head. 165, 166, *burckhardti*: (165) forewing; (166) head.

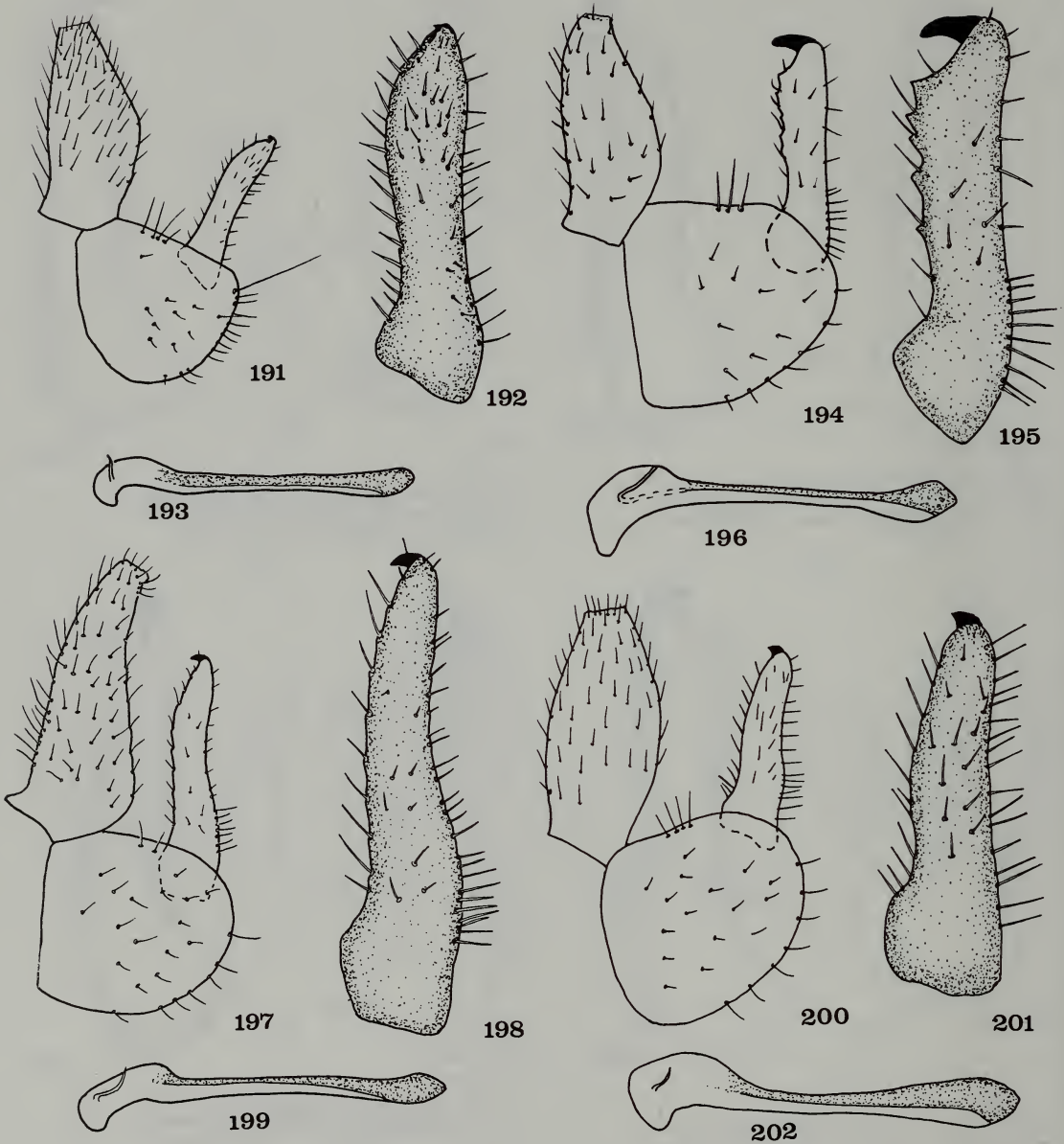


**Figs 167-178** *Livilla* species. 167-169, *ulicis*: (167) ♂ genitalia, lateral view; (168) ♂ paramere, outer view; (169) apical segment of aedeagus. 170-172, *bivittata*: (170) ♂ genitalia, lateral view; (171) ♂ paramere, outer view; (172) apical segment of aedeagus. 173-175, *vicina*: (173) ♂ genitalia, lateral view; (174) ♂ paramere, outer view; (175) apical segment of aedeagus. 176-178, *cognata*: (176) ♂ genitalia lateral view; (177) ♂ paramere, outer view; (178) apical segment of aedeagus.

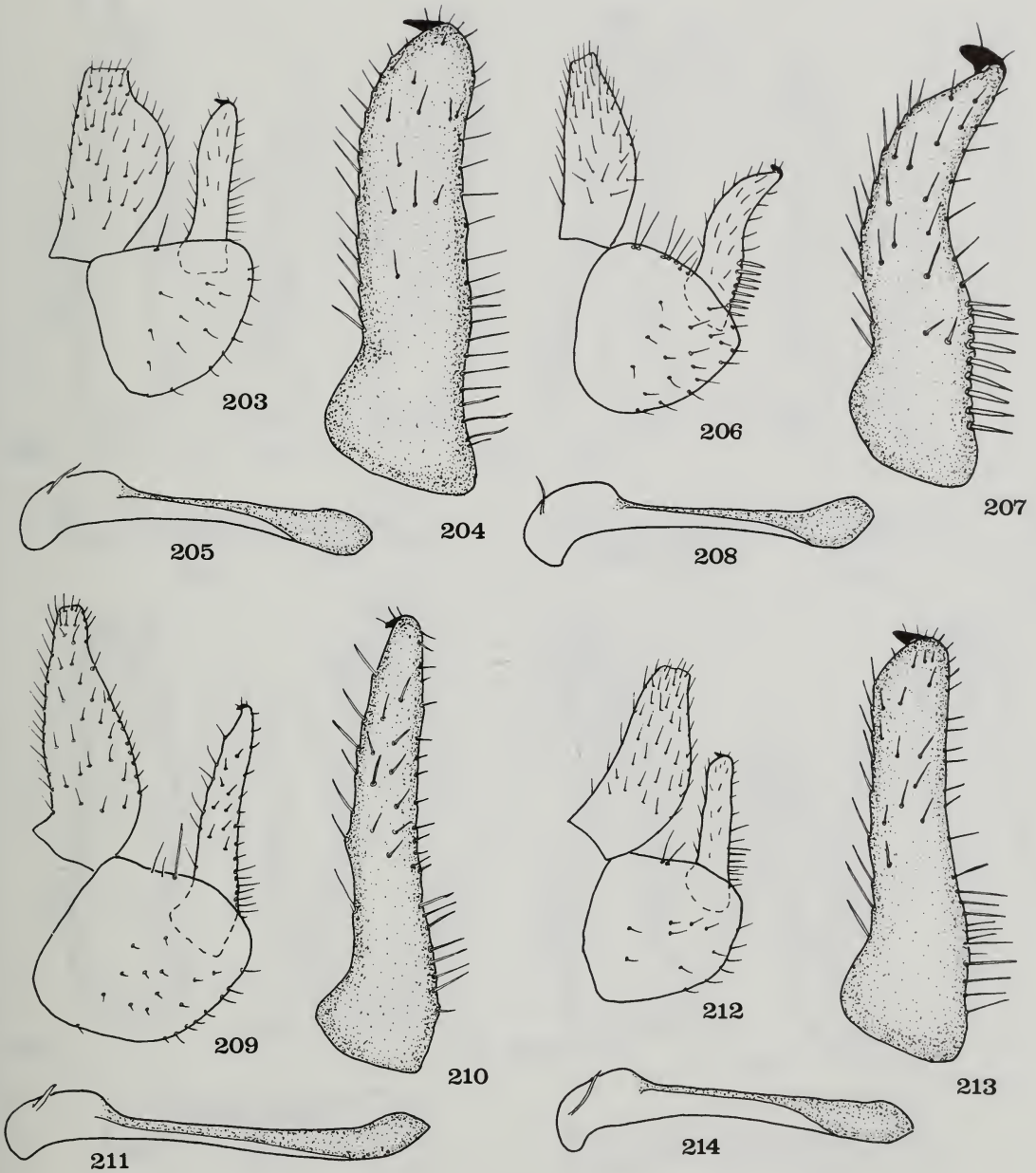


**Figs 179–190** *Livilla* species. 179–181, *nervosa*: (179) ♂ genitalia, lateral view; (180) ♂ paramere, outer view; (181) apical segment of aedeagus. 182–184, *nigrilineata*: (182) ♂ genitalia, lateral view; (183) ♂ paramere, outer view; (184) apical segment of aedeagus. 185–187, *horvathi*: (185) ♂ genitalia, lateral view; (186) ♂ paramere, outer view; (187) apical segment of aedeagus. 188–190, *vittipennella*: (188) ♂ genitalia, lateral view; (189) ♂ paramere, outer view; (190) apical segment of aedeagus.

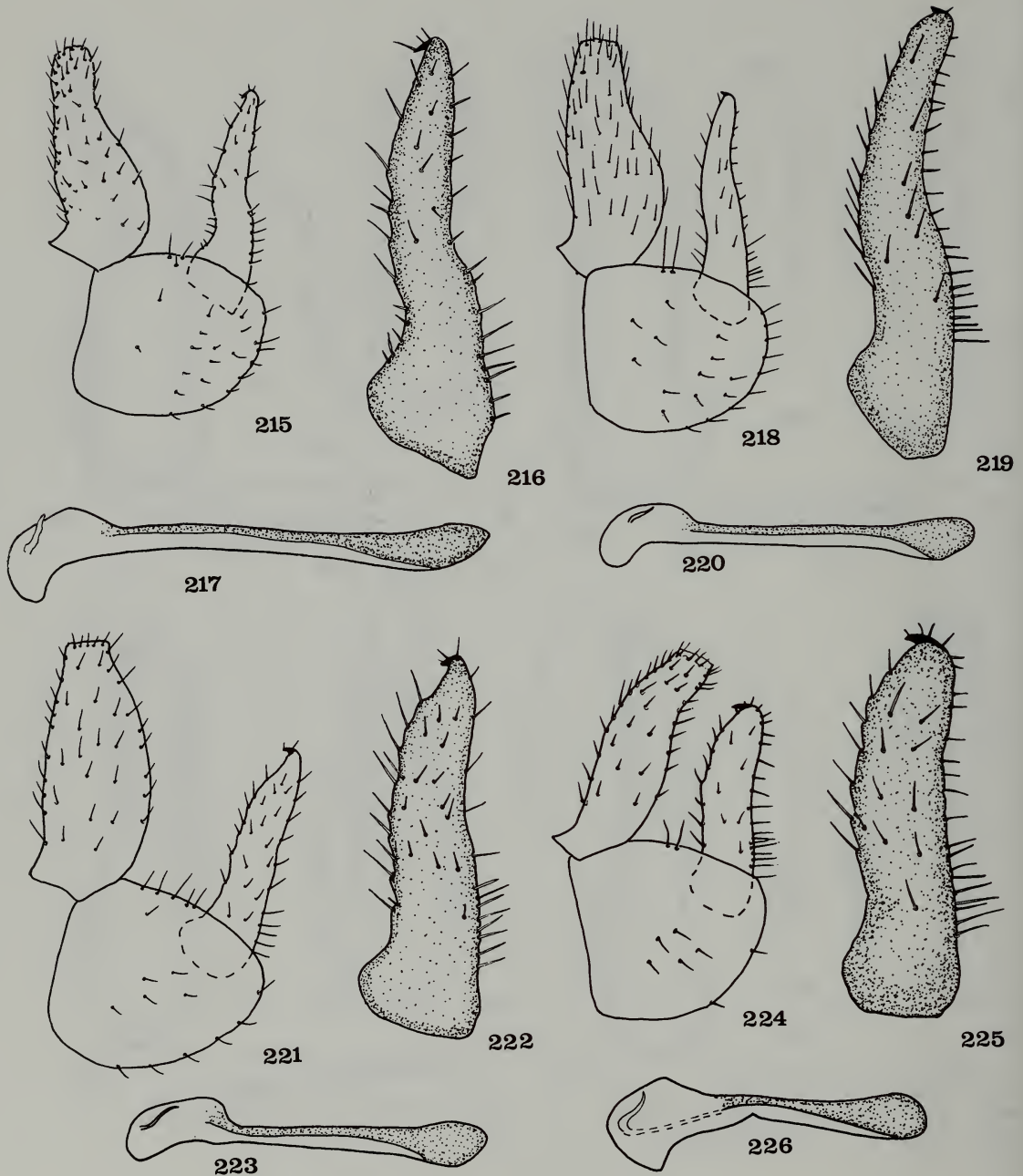




Figs 191–202 *Livilla* species. 191–193, *retamae*: (191) ♂ genitalia, lateral view; (192) ♂ paramere, outer view; (193) apical segment of aedeagus. 194–196, *lautereri*: (194) ♂ genitalia, lateral view; (195) ♂ paramere, outer view; (196) apical segment of aedeagus. 197–199, *syriaca*: (197) ♂ genitalia, lateral view; (198) ♂ paramere, outer view; (199) apical segment of aedeagus. 200–202, *radiata*: (200) ♂ genitalia, lateral view; (201) ♂ paramere, outer view; (202) apical segment of aedeagus.

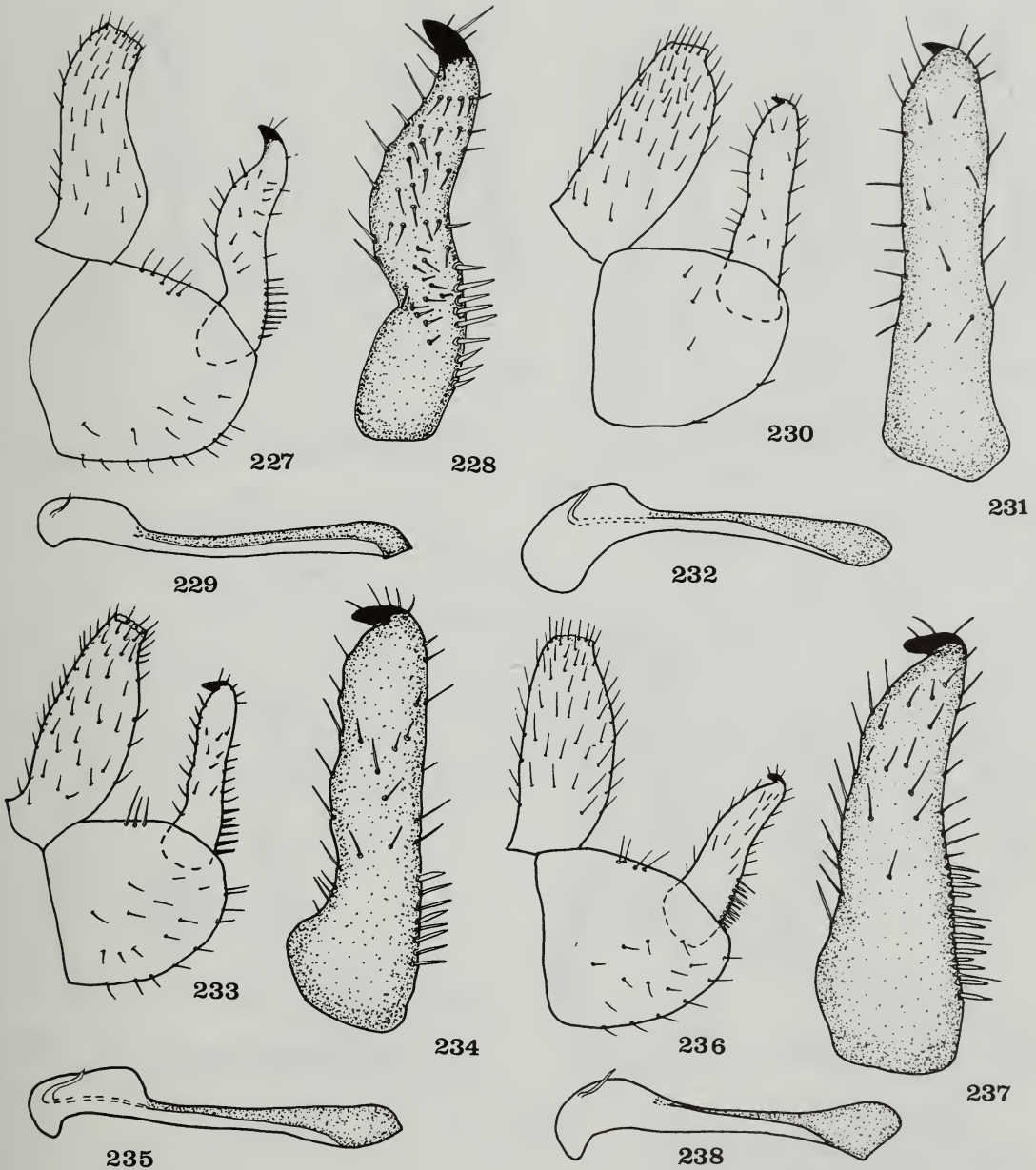


**Figs 203–214** *Livilla* species. 203–205, *cataloniensis*: (203) ♂ genitalia, lateral view; (204) ♂ paramere, outer view; (205) apical segment of aedeagus. 206–208, *maculipennis*: (206) ♂ genitalia, lateral view; (207) ♂ paramere, outer view; (208) apical segment of aedeagus. 209–211, *siciliensis*: (209) ♂ genitalia, lateral view; (210) ♂ paramere, outer view; (211) apical segment of aedeagus. 212–214, *pyrenaea*: (212) ♂ genitalia, lateral view; (213) ♂ paramere, outer view; (214) apical segment of aedeagus.

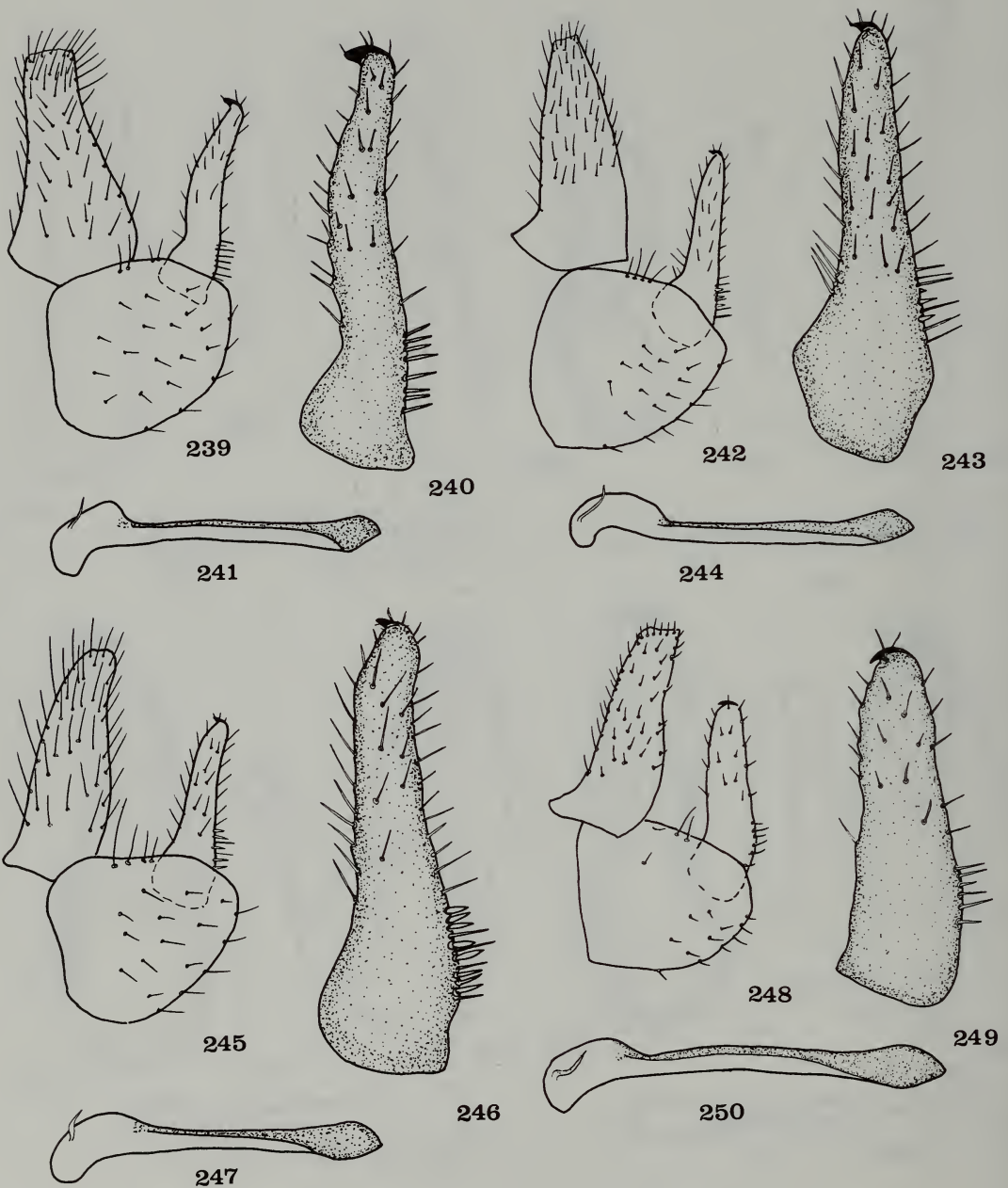


Figs 215–226 *Livilla* species. 215–217, *magna*: (215) ♂ genitalia, lateral view; (216) ♂ paramere, outer view; (217) apical segment of aedeagus. 218–220, *spartiisuga*: (218) ♂ genitalia, lateral view; (219) ♂ paramere, outer view; (220) apical segment of aedeagus. 221–223, *hodkinsoni*: (221) ♂ genitalia, lateral view; (222) ♂ paramere, outer view; (223) apical segment of aedeagus. 224–226, *poggii*: (224) ♂ genitalia, lateral view; (225) ♂ paramere, outer view; (226) apical segment of aedeagus.

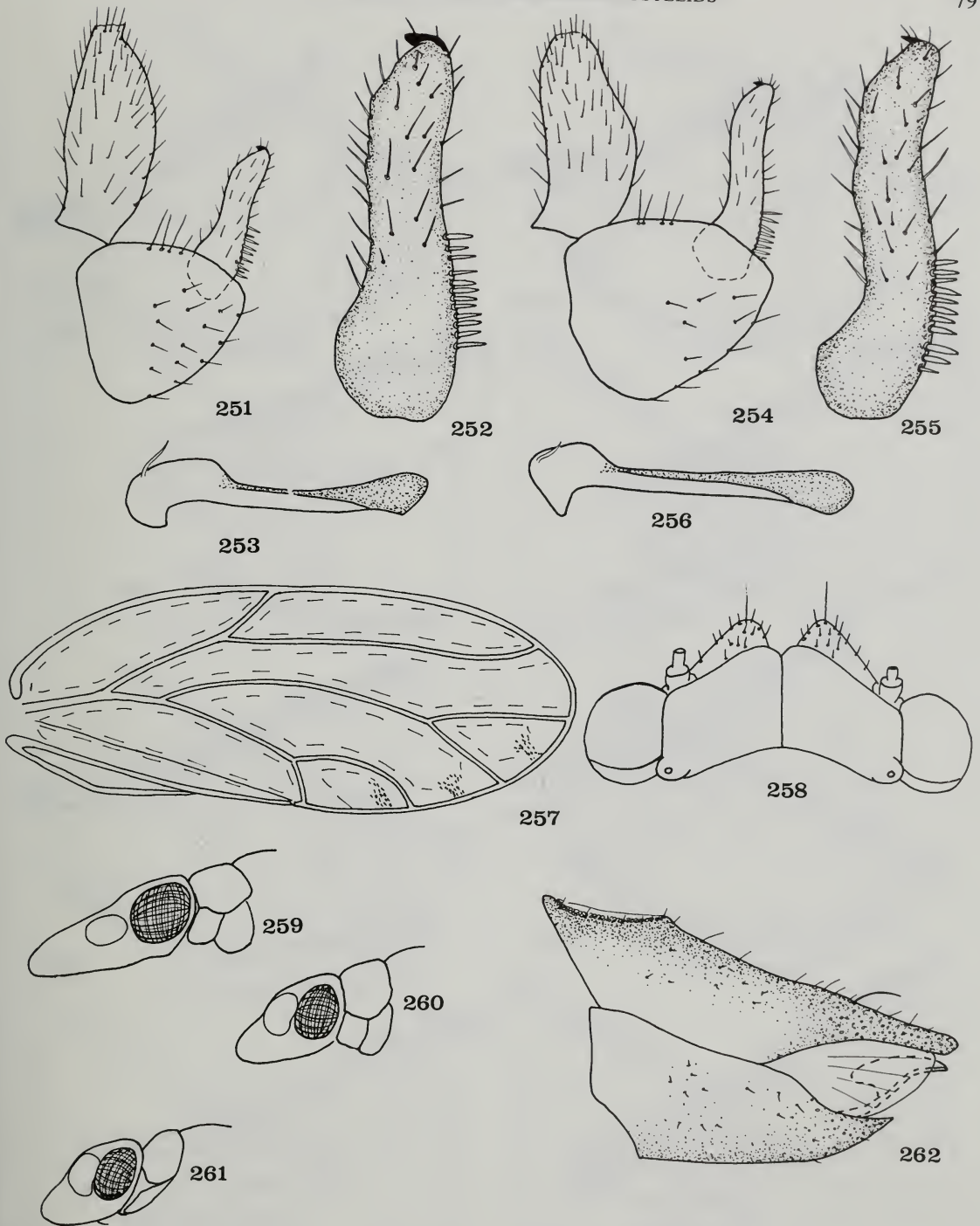




**Figs 227–238** *Livilla* species. 227–229, *genistae*: (227) ♂ genitalia, lateral view; (228) ♂ paramere, outer view; (229) apical segment of aedeagus. 230–232, *klapperichi*: (230) ♂ genitalia, lateral view; (231) ♂ paramere, outer view; (232) apical segment of aedeagus. 233–235, *pseudoretamae*: (233) ♂ genitalia, lateral view; (234) ♂ paramere, outer view; (235) apical segment of aedeagus. 236–238, *blandula*: (236) ♂ genitalia, lateral view; (237) ♂ paramere, outer view; (238) apical segment of aedeagus.

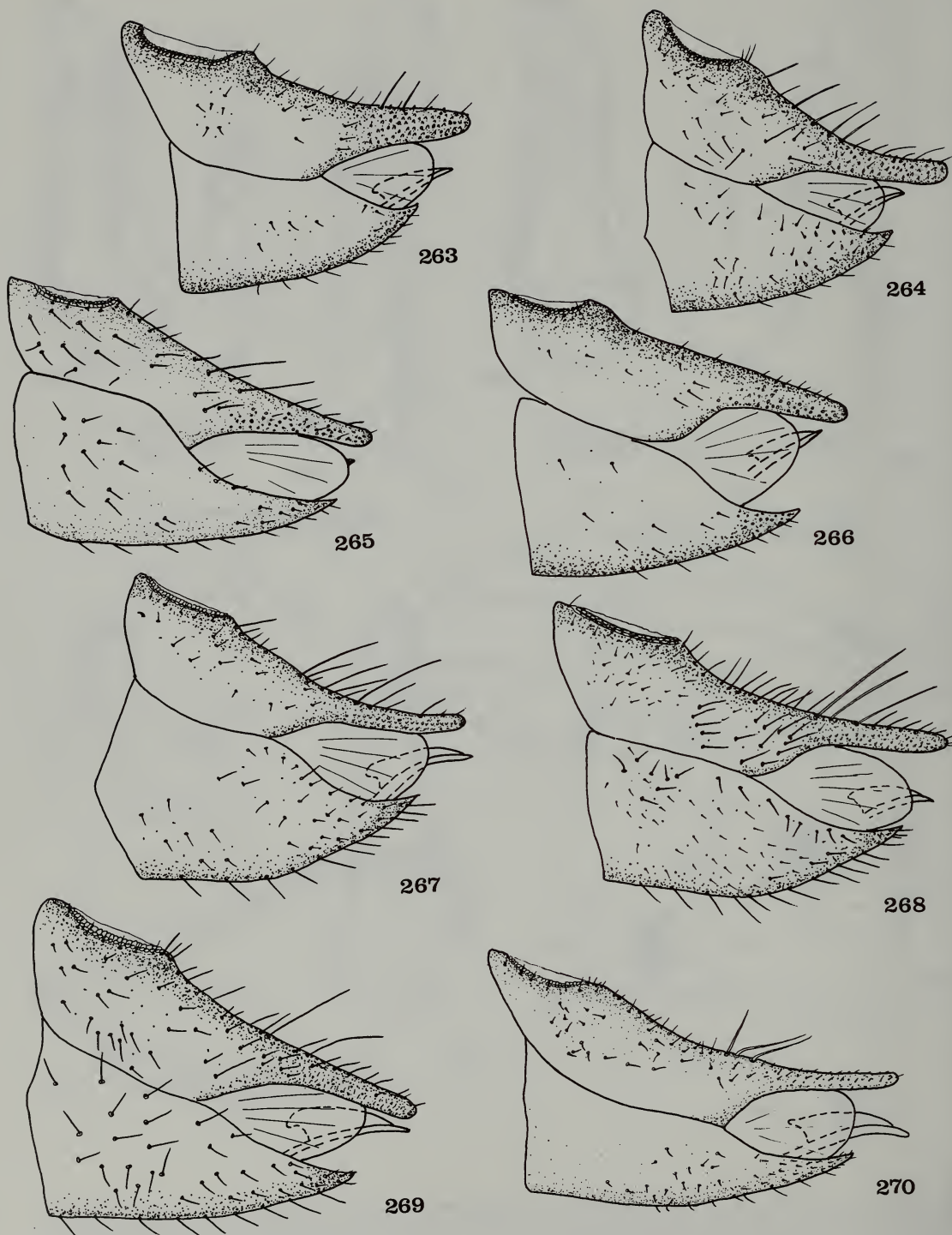


Figs 239–250 *Livilla* species. 239–241, *adusta*: (239) ♂ genitalia, lateral view; (240) ♂ paramere, outer view; (241) apical segment of aedeagus. 242–244, *spectabilis*: (242) ♂ genitalia, lateral view; (243) ♂ paramere, outer view; (244) apical segment of aedeagus. 245–247, *variegata*: (245) ♂ genitalia, lateral view; (246) ♂ paramere, outer view; (247) apical segment of aedeagus. 248–250, *burckhardtii*: (248) ♂ genitalia, lateral view; (249) ♂ paramere, outer view; (250) apical segment of aedeagus.

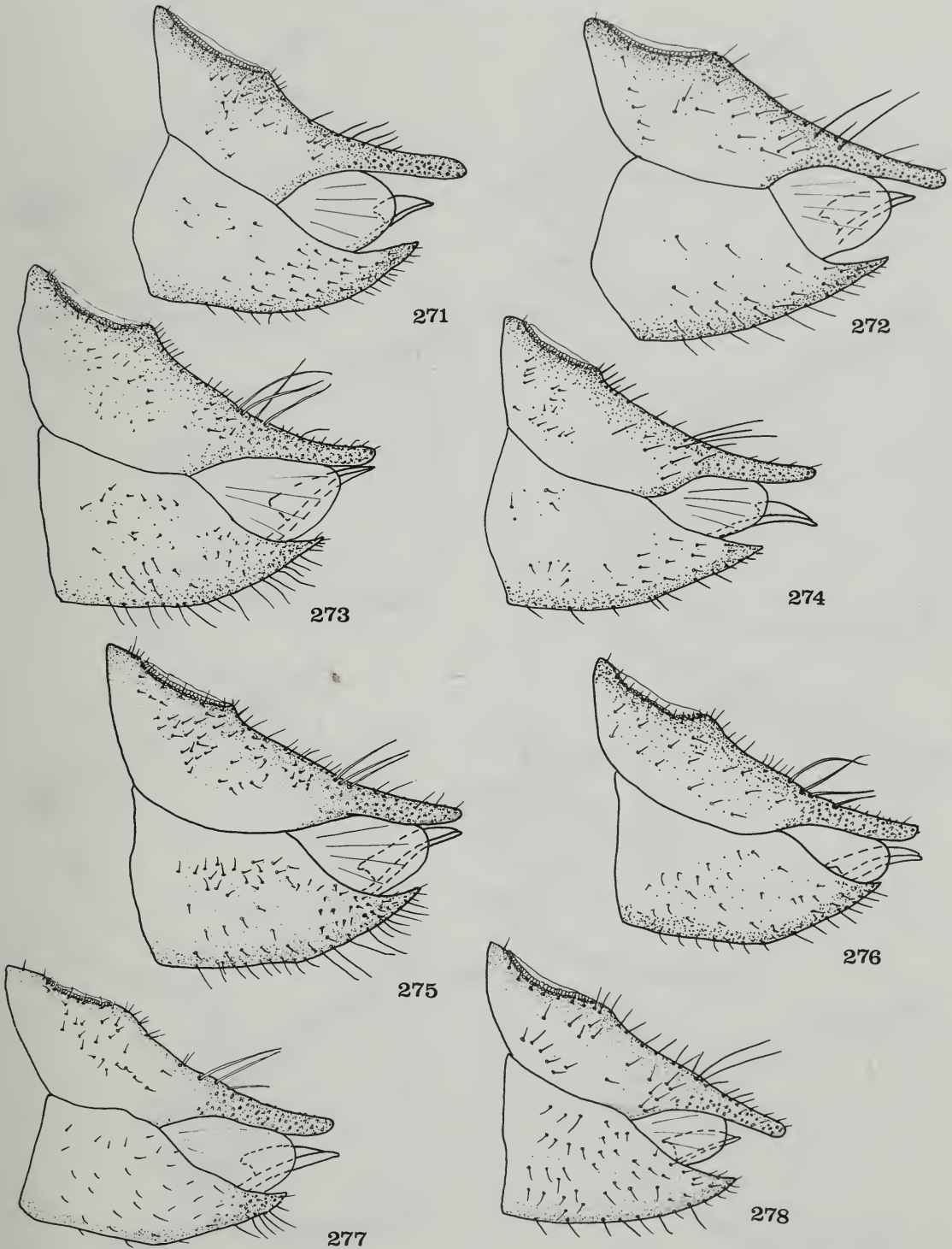


**Figs 251–262** *Livilla*, *Arytaina*, *Acizzia* and *Cyamophila* species. 251–253, *L. lustianica*: (251) ♂ genitalia, lateral view; (252) ♂ paramere, outer view; (253) apical segment of aedeagus. 254–256, *L. bimaculata*: (254) ♂ genitalia, lateral view; (255) ♂ paramere, outer view; (256) apical segment of aedeagus. 257, 258, *Arytaina africana* (after Heslop-Harrison): (257) forewing; (258) head. 259, *Livilla*, head and prothorax. 260, *Arytaina*, head and prothorax. 261, *Cyamophila*, head and prothorax. 262, *Acizzia hollisi*, ♀ terminalia, lateral view.

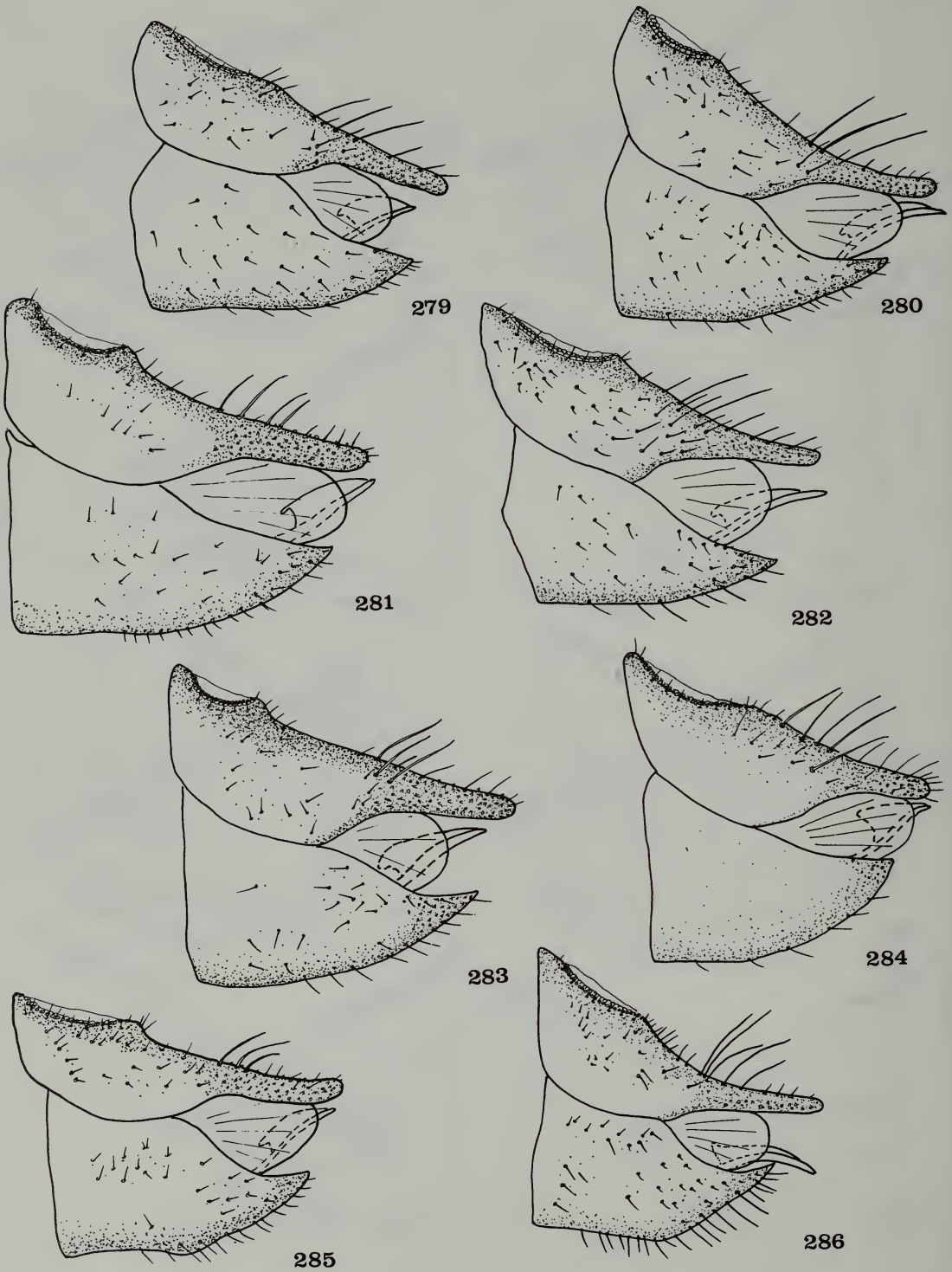




Figs 263–270 *Livilla*, ♀ terminalia, lateral view. 263, *ulicis*. 264, *bivittata*. 265, *vicina*. 266, *cognata*. 267, *adjusta*. 268, *spectabilis*. 269, *variegata*. 270, *burckhardti*.

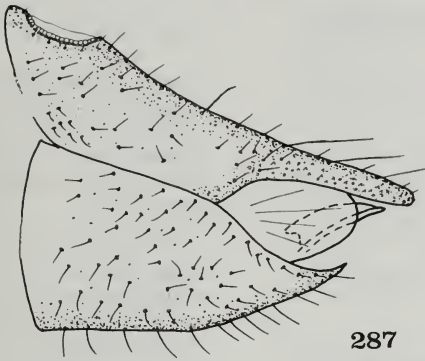


Figs 271–278 *Livilla*, ♀ terminalia, lateral view. 271, *cataloniensis*. 272, *maculipennis*. 273, *siciliensis*. 274, *pyrenaea*. 275, *magna*. 276, *spartiisuga*. 277, *hodkinsoni*. 278, *blandula*.



Figs 279–286 *Livilla*, ♀ terminalia, lateral view. 279, *lusitanica*. 280, *bimaculata*. 281, *poggii*. 282, *maura*. 283, *genistae*. 284, *klapperichi*. 285, *pseudoretamae*. 286, *syriaca*.

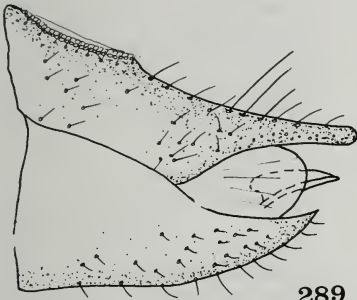




287



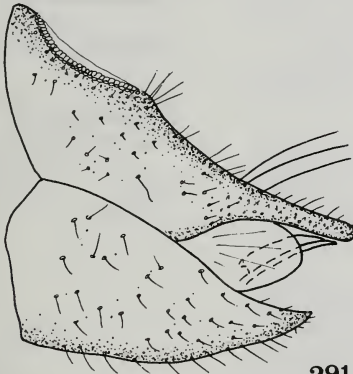
288



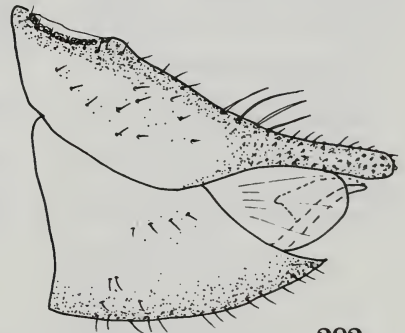
289



290



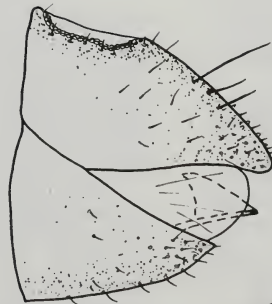
291



292



293



294

**Figs 287–294** *Livilla* and *Acizzia*, ♀ terminalia, lateral view. 287, *L. nervosa*. 288, *L. nigralienata*. 289, *L. horvathi*. 290, *L. vittipennella*. 291, *L. retamae*. 292, *L. lautereri*. 293, *A. uncatoides*. 294, *A. acaciaebaileyanae*.

## Index to host plants

- Acacia* 2, 3, 4, 5, 43  
*Acacia baileyana* 5  
*confusa* 6  
*floribunda* 6  
*koa* 6  
*koaia* 6  
*podalyriaefoliae* 5  
*raddiana* 5, 6  
*saligna* 6  
*verniciiflua* 6  
 Acaciae 4  
*Adenocarpus* 42, 43, 44  
*Adenocarpus anagyris* 2  
*complicatus* 13  
*hispanicus* 13  
*Albizia* 2, 3, 4, 43  
*Albizia lophantha* 6  
*Anthyllis* 8  
*Anthyllis vulneraria* 9  
*Argyrocytisus* 44  
*Argyrolobium* 44  
*Astragalus* 8  
*Astragalus* sp. 10  
*Calicotome* 43, 44  
*Calicotome spinosa* 18, 22, 34, 42  
*Chamaecytisus* 43, 44  
*Chamaecytisus austriacus* 15, 27, 29  
*borysthenicus* 17, 29  
*heuffelii* 15  
*ratisbonensis* 17, 26, 29  
*supinus* 26  
*Cytisophyllum* 44  
*Cytisus* 42, 43, 44  
*Cytisus*-group 43, 44  
*Cytisus fragrans* 42  
*proliferus* 42  
*purgans* 39  
*scoparius* 2, 15, 39, 42  
*Echinospartium* 44  
 Erinacea 44  
 Galegeae 2, 7, 43  
*Genista* 43, 44  
*Genista*-group 43, 44  
*Genista acanthoclada* 31, 33  
*aetnensis* 23, 36  
*corsica* 22, 37  
*fasselata* 21, 31  
*germanica* 26  
*hirsuta* 23, 35  
*hispanica* 19  
*pilosa* 22, 34  
*radiata* 25, 27, 28  
*salzmanii* 34  
 spp. 16, 25, 32, 33, 39  
*tinctoria* 15, 24, 42  
*triacanthos* 23, 36  
 Genisteae 2, 3, 11, 19, 43, 44  
 Genistinae 43, 44  
*Glycyrrhiza* 8  
*Glycyrrhiza glabra* 8  
*Gonocytisus* 44  
*Hesperolaburnum* 44  
 Ingae 4  
*Laburnum* 43, 44  
*Laburnum alpinum* 38  
*anagyroides* 38  
 spp. 23  
 Leguminosae 7  
*Lembotropis nigricans* 29  
 Loteae 2, 7, 43  
 Lupininae 43, 44  
*Medicago* 8  
*Medicago sativa* 9  
*Ononis spinosa* 24  
*Petteria* 44  
*Podocytisus* 44  
*Retama* 43, 44  
*Retama monosperma* 30  
*raetam* 30, 42  
 sp. 21  
*sphaerocarpa* 30  
 Rosaceae 7  
 Sophoreae 2, 7, 43  
*Spartium* 43, 44  
*Spartium junceum* 21, 37, 43  
*Stauracanthus* 44  
 Trifoleae 2, 7, 43  
*Ulex* 43, 44  
*Ulex europaeus* 24  
*parviflorus* 33  
*Vicia* 8  
*Vicia* sp. 9

## Index

Invalid names are in *italics*; principal references are in **bold**

- acaciae (Psylla) 4  
 acaciaebaileyanae (Acizzia) 4  
 (key), 5, 6, 10  
 acaciaebaileyanae (Psylla) 5  
 acaciaebaileyanae-group 4 (key), 5  
 acaciae-baileyanae (Arytaina) 5  
 acaciae-baileyanae (Psylla) 5  
 Acizzia 2, 3 (key), 4, 10, 43  
 Acizzinae 2, 3 (key), 4, 43  
 adenocarpi (*Arytaena*) 13  
 adenocarpi (Arytaina) 12, 13  
 (key), 16, 17, 18, 44  
 adusta (*Floria*) 39  
 adusta (Livilla) 21 (key), 39, 40  
 africana 12 (key), 13–14, 18  
 albizziae (Acizzia) 11  
 albizziae (Arytaina) 11  
*Allaoneura* 19  
*Allooneura* 2, 19, 29, 41  
*alpina* (*Floria*) 38  
*Amblyrhina* 2, 10, 11, 19, 26  
*Amblyrhina* 25  
 Amorphicola 2  
 angustatipennis (*Amblyrhina*) 14  
 angustatipennis (Arytaina) 12  
 (key), 14, 18  
 annosa (*Floria* (Brinckitia)) 19  
 antennata (Retroacizzia) 11  
*Arytaina* 15  
*Arytaena* 15, 24  
 Arytaina 2, 3 (key), 7, 10–11, 17,  
 18, 24, 42, 43, 44  
 Arytainilla 2, 4 (key), 41, 42, 43,  
 44  
 Arytaininae 2, 3 (key), 4, 7, 43  
 Arytainini 2, 7  
 assimilis (Arytaina) 11  
 assimilis (Ceanothia) 11  
 Astragalita 2, 43  
*Ataenia* 15  
 atlasiensis 12 (key), 14, 18  
 bicolor (Arytaina) 11  
 bicolor (Ceanothia) 11  
 bicolorata (Acizzia) 5 (key), 7, 10  
 bicolorata (Psylla) 7  
 bimaculata 22 (key), 34–35, 40  
 bivittata 3, 4, 20 (key), 24, 25, 40  
 blandula (*Floria*) 35  
 blandula (Livilla) 23 (key), 35, 36,  
 40  
 boharti (Arytaina) 11  
 boharti (Ceanothia) 11  
 brevigena (Arytaina) 11  
 brevigena (Innesia) 11  
 Brinckitia 19

- burckhardti 3, 20 (key), 25, 40  
burckhardti-group 19, 20 (key), 25
- callunae* (Psylla) 23  
*cataloniensis* (*Floria*) 31  
*cataloniensis* (Livilla) 22 (key), 32–33, 40  
*Ceanothia* 11  
*Chermes* 15  
Ciriacreminae 2  
cognata Löw (*Amblyrhina*) 25  
cognata Löw (*Amblyrrhina*) 25  
cognata Loginova (*Arytainilla*) 42  
cognata (Löw) (Livilla) 3, 20 (key), 25–26, 40, 42, 43  
*coleoptera* (Psylla) 23  
cornicola (*Arytaina*) 11  
crawfordi (*Insnesia*) 11  
Cyamophila 2, 3 (key), 7, 9, 10, 43  
Cyamophilini 2  
*cytisi* Becker (*Psyllodes*) 29  
*cytisi* (Puton) (*Arytainilla*) 41, 42, 44
- delarbrei (*Arytainilla*) 41, 42, 43  
delarbrei (Psylla) 41  
devia (*Arytaina*) 11  
devia (*Arytainilla*) 4, 11, 42, 43, 44  
diluta 42  
dividens 42, 43  
dividens-group 41, 42  
dividens-subgroup 41, 42
- egena 41, 42, 44  
equitans 42  
equitans-subgroup 41, 42  
essigi (*Arytaina*) 11  
essigi (*Ceanothia*) 11  
Euphalerus 11  
Euryconus 11
- fabra (Psylla) 7  
fasciata (*Arytaina*) 11  
flava (*Arytaina*) 11  
flava (*Insnesia*) 11  
*Floria* 2, 19  
*Floriella* 19
- genistae Fabricius (Psylla) 15  
genistae (Latreille) (*Arytaina*) 15  
genistae (Latreille) (*Arytaena*) 15  
genistae (Latreille) (*Arytaina*) 2, 12 (key), 14–15, 16, 17, 18, 43  
genistae (Latreille) (*Chermes*) 15  
genistae (Latreille) (*Chermes* (*Ataenia*)) 15  
genistae Latreille (Psylla) 10, 14  
genistae Ramirez Gomez (Livilla) 3, 20 (key), 38–39, 40  
glycyrrhizae (*Cacopsylla*) 8  
glycyrrhizae (*Cyamophila*) 8 (key), 10  
glycyrrhizae (Psylla) 8  
glycyrrhizae (*Psyllodes*) 8  
gredi 42, 43
- hakani 42  
hispanica 12 (key), 16, 18  
*Hispaniola* 41  
hodkinsoni (*Floria*) 33  
hodkinsoni (Livilla) 22 (key), 33, 40  
hollisi 5 (key), 6, 10  
hollisi-group 4 (key), 6  
horvathi (*Floria*) 26  
horvathi (Livilla) 21 (key), 26–27, 40  
horvathi-group 19, 20 (key), 26, 27, 39, 43
- ima 42  
incuba 42  
Insnesia 11  
insolita (*Arytaina*) 11  
insolita (*Ceanothia*) 11  
iolani (*Arytaina*) 11  
iolani (*Insnesia*) 11  
isitis (*Euphalerus*) 11  
isitis (Psylla) 11
- klapperichi 21 (key), 28–29, 40
- lactea* (Psylla) 29  
lautereri 21 (key), 30–31, 40  
*Lindbergia* 41  
*lineata* (*Floria*) 28  
Livilla 2, 4 (key), 19, 26, 29, 35, 39, 40, 43, 44  
longicella 11 (key), 16, 18  
lusitanica 23 (key), 35, 36, 40
- maculata (*Amblyrhina*) 16  
maculata (*Amblyrrhina*) 16  
maculata (*Arytaina*) 12 (key), 14, 15, 16–17, 18, 43  
maculipennis 22 (key), 32, 33–34, 40  
*maculosa* (*Amblyrhina*) 16  
magna Hodkinson & Hollis (Livilla) 23 (key), 36, 40  
magna Crawford (*Psyllopa*) 10, 15  
magnidentata 13 (key), 17, 18  
maura Loginova (*Floria*) 35  
maura Vondráček (*Floria*) 39, 40  
maura Vondráček (Livilla) 22, 23 (key), 35, 39–40  
medicaginis (*Cacopsylla*) 9  
medicaginis (*Cyamophila*) 8 (key), 9, 10  
medicaginis (Psylla) 9  
meridionalis (*Arytaina*) 11  
meridionalis (*Insnesia*) 11  
mitella (*Arytaina*) 11  
mitella (*Ceanothia*) 11  
modica 42  
*montana* (*Arytaena*) 24  
*montana* (*Arytaina*) 24  
mopanei (*Arytaina*) 11  
mopanei (*Retroacizzia*) 11
- Neopsylla* 4  
nervosa 20 (key), 27, 40
- nigralineata Loginova (*Arytainilla*) 42  
nigralineata Hodkinson & Hollis (Livilla) 21 (key), 27, 40  
nubivaga (*Arytaina*) 11  
nubivaga (*Arytainilla*) 4, 11, 42, 43
- obscura (*Acizzia*) 11  
obscura (*Psyllopa*) 11  
*odontopyx* 8
- pechai (*Amblyrhina*) 11  
pechai (Spanioneura) 11  
Peripsyllopsis 11  
pileolata 42  
poggii (*Floria*) 36  
poggii (Livilla) 22 (key), 36–37, 40  
proboscidea 42  
proboscidea-subgroup 41, 42  
prognata 42  
prognata-subgroup 41, 42  
prohaskai (*Cyamophila*) 8 (key), 9, 10, 43  
prohaskai (Psylla) 9  
Pseudacanthopsylla 2  
pseudoretamae 21 (key), 35–36, 40  
Psylla 11, 15, 19, 23  
Psyllidae 2  
Psyllinae 2, 4, 7, 43  
*Psyllopa* 10  
pulchra Crawford, 1919 (*Arytaina*) 11  
pulchra (Crawford, 1919) (*Euryconus*) 11  
pulchra Crawford, 1920 (*Arytaina*) 11  
pulchra (Crawford, 1920) (*Insnesia*) 11  
punctinervis (*Arytaina*) 11  
punctinervis (*Euphalerus*) 11  
putoni 17  
putonii (*Amblyrhina*) 17  
putonii (*Arytaina*) 12 (key), 17–18, 19, 44  
pyrenaea (*Floria*) 34  
pyrenaea (*Floria* (*Floriella*)) 34  
pyrenaea (Livilla) 22 (key), 34, 40, 43  
pyrenaea (Psylla) 19, 34  
*pyrenaea* 34
- radiata (*Aleuroneura*) 29  
radiata (*Allaeoneura*) 29  
radiata (*Alloeoneura*) 29  
radiata (*Arytaina*) 19, 29  
radiata (Livilla) 20 (key), 29, 41, 43  
radiata (Psylla) 29  
radiata-group 19, 20–21 (key), 27, 29  
ramarkrishni 11  
retamae (*Alloeoneura*) 30  
retamae (*Floria*) 30  
retamae (*Floria* (*Brinckitia*)) 30



- retamae (Livilla) 21 (key), **30**, 31, 36, 41  
 retamae (Psylla) 30  
 Retroacizzia 11
- siciliensis 22 (key), **32**, 36, 41  
 Spanioneura 11  
*spartii* Guérin (Psylla) 41  
*spartii* (Hartig) (Arytaina) 15  
*spartii* Hartig (Psylla) 10, 15  
 spartiicola 42, 43  
 spartiisuga (*Floria*) 31  
 spartiisuga (Livilla) 22 (key), **31–32**, 41  
 spartiisuga (Psylla) 31  
 spartiisuga-group 19, 21–22 (key), **31**, 39, 43  
*Spartina* 41  
 spartiophila (Arytainilla) 2, 42, 43  
 spartiophila (Psylla) 18  
 spartiophila-group 41, 42  
 spectabilis (*Floria*) 37  
 spectabilis (Livilla) 20, 21 (key), **37**, 41, 43
- spectabilis (Psylla) 37  
*spinosa* (Acizzia) 11  
*spinosa* (Arytaina) 11  
 stocklosai 8 (key), **10**  
 syriaca (*Floria*) 31  
 syriaca (Livilla) 21 (key), **31**, 41  
*syriacea* 31
- thakrei (Arytaina) 11  
 thakrei (Insnesia) 11  
 torifrons (*Amblyrhina*) 18  
 torifrons (Arytaina) 12 (key), 16, **18–19**, 43  
 torifrons (Psylla) 10, 18  
 tuberculata (Arytaina) 11  
 tuberculata (Insnesia) 11  
 turkiana (*Amblyrhina*) 11  
 turkiana (Spanioneura) 11
- uichancoi (Arytaina) 11  
 uichancoi (Insnesia) 11  
*ulicis* (Curtis, 1835) (Arytaina) 15  
*ulicis* Curtis, 1835 (Psylla) 15  
*ulicis* (Curtis, 1835) (*Arytaena*) 15
- ulicis* Curtis, 1836 (Livilla) 4, 19, 20 (key), **23–24**, 25, 41  
*ulicis*-group 19, 20 (key), **23**, 39  
 umbonata 41, 42  
*uncata* (Psylla) 5  
 uncatoides (Acizzia) 4 (key), **5–6**, 10  
 uncatoides (Psylla) 5  
*unctata* 5
- variabilis (Arytaina) 11  
 variabilis (Insnesia) 11  
 variegata (*Floria*) 38  
 variegata (Livilla) 22, 23 (key), **38**, 41, 43  
 vicina (*Floria*) 24  
 vicina (Livilla) 3, 4, 20 (key), **24–25**, 41  
 virgina 11  
*vittipennella* 28  
*vittipennella* (*Floria*) 26, 28  
*vittipennella* (Livilla) 21 (key), **28**, 41  
*vittipennella* (Psylla) 28